APPENDIX A - SCOPING FOR THIS DRAFT ENVIRONMENTAL IMPACT STATEMENT

Docket No. **70-3103**

ENVIRONMENTAL IMPACT STATEMENT SCOPING PROCESS

SCOPING SUMMARY REPORT

Proposed Louisiana Energy Services National Enrichment Facility

Lea County, New Mexico

April 2004

U.S. Nuclear Regulatory Commission
Rockville, Maryland

1. INTRODUCTION

By letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

The LES facility, if licensed, would enrich uranium for use in commercial nuclear fuel for power reactors. Feed material would be natural (not enriched) uranium in the form of uranium hexafluoride (UF_6). LES proposes to use centrifuge technology to enrich the isotope uranium-235 in the UF_6, up to 5 percent. The centrifuge would operate at below atmospheric pressure. The capacity of the plant would be up to 3 million separative work units (SWU).[1]

In accordance with NRC regulations at 10 CFR Part 51 and the National Environmental Policy Act (NEPA), the NRC staff is preparing an Environmental Impact Statement (EIS) on the proposed facility as part of its decision-making process. The EIS will examine the potential environmental impacts associated with the proposed LES facility in parallel with the review of the license application. In addition to the EIS, the NRC staff will prepare a Safety Evaluation Report (SER) on health and safety issues raised by the proposed action. The SER will document the NRC staff evaluation of the safety of the activities proposed by LES in its license application and the compliance with applicable NRC regulations.

As part of the NEPA process, the scoping process was initiated on February 4, 2004, with the publication in the *Federal Register* of a Notice of Intent to prepare an EIS and to conduct the scoping process (69 *Federal Register* 5374-5375). Scoping is an early and open process designed to help determine the range of actions, alternatives, and potential impacts to be considered in the EIS, and to identify significant issues related to the proposed action. Input from the public and other agencies is solicited so the analysis can be more clearly focused on issues of genuine concern.

On March 4, 2004, the NRC staff held a public scoping meeting in Eunice, New Mexico, to solicit both oral and written comments from interested parties. The public scoping meeting began with NRC staff providing a description of the NRC's role, responsibilities, and mission. A brief overview of the safety review process (i.e., preparation of the SER) was followed by a description of the environmental review process and a discussion on how the public can effectively participate in the process. The bulk of the meeting was allotted for attendees to make comments on the scope of the review.

This report has been prepared to summarize the determinations and conclusions reached in the scoping process. After publication of a draft EIS, the public will be invited to comment on that document. Availability of the draft EIS, the dates of the public comment period, and information about the public meeting will be announced in the *Federal Register,* on NRC's LES website (http://www.nrc.gov/materials/fuel-cycle-fac/lesfacility.html) and in the local news media when the draft EIS is distributed. After evaluating comments on the draft EIS, the NRC staff will issue a final EIS that will serve as the basis for the NRC's consideration of environmental impacts in its decision on the proposed facility.

[1]SWU relates to a measure of the work used to enrich uranium.

Section 2 of this report summarizes the comments and concerns expressed by government officials, agencies, and the public. Section 3 identifies the issues the draft EIS will address and Section 4 identifies those issues that are not within the scope of the draft EIS. Where appropriate, Section 4 identifies other places in the decisionmaking process where issues that are outside the scope of the draft EIS may be considered.

2. ISSUES RAISED DURING THE SCOPING PROCESS

2.1 OVERVIEW

Approximately, 250 individuals attended the March 4, 2004, public scoping meeting concerning the LES National Enrichment Facility (NEF). During the meeting, 43 individuals offered comments. Of these 43 commenters, 33 individuals fully supported construction of the LES NEF. Two commenters provided petitions to the NRC staff at the meeting with over 2,080 signatures in support of the NEF licensing and construction. This petition stated that "the signers of this petition believe this facility will be safely operated, contribute to energy independence and security for the United States and provide substantial economic benefits to our communities." In addition, 127 written comments were received from various individuals during the public scoping period, which ended on March 18, 2004. Of these127 written comments, the NRC staff received approximately 60 letters expressing support for the proposed project.

This active participation by the public in the scoping process is an important component in determining the major issues that the NRC should assess in the draft EIS. Individuals providing oral and written comments addressed several subject areas related to the proposed LES facility and the draft EIS development. In addition to private citizens, the various commenters included:

- A Member of Congress.
- New Mexico State Representatives.
- Local officials from the cities of Eunice, Hobbs, Jal, Lovington and Andrews.
- Representatives of Federal agencies or organizations.
- Representatives of State of New Mexico agencies or departments.
- Representatives of other organizations including:
  - -- Citizens for Alternatives to Radioactive Dumping
  - -- Citizens Nuclear Information Center
  - -- Concerned Citizens for Nuclear Safety
  - -- Creative Commotion
  - -- *Eunice News*
  - -- Forest Guardians
  - -- Institute for Energy and Environmental Research
  - -- Hispanic Workers Council
  - -- National Association for the Advancement of Colored People
  - -- New Mexico Audubon Council
  - -- New Mexico Junior College
  - -- Nuclear Information and Resource Service
  - -- Nuclear Workers for Justice
  - -- Public Citizen
  - -- Southwest Research and Information Center
  - -- United Way of Lea County.

The following general topics categorize the comments received during the public scoping period:

- NEPA and public participation.

- Land use and site selection.
- Need.
- Alternatives.
- Ecology, geology, emissions, soil, and water resources.
- Socioeconomics.
- Environmental justice.
- Transportation.
- Waste management.
- Cumulative impacts.
- Decommissioning.
- Safety and risk.
- Nonproliferation and security.
- Terrorism.
- Credibility.

In addition to raising important issues about the potential environmental impacts of the proposed facility, some commenters offered opinions and concerns that typically would not be included in the subject matter of an EIS–these include general opinions about LES or issues that are more appropriately considered in the SER. Comments of this type are taken into consideration by the NRC staff, but they do not point to significant environmental issues to be analyzed. Other statements may be relevant to the proposed action, but they have no direct bearing on the evaluation of alternatives or on the decision-making process involving the proposed action. For instance, general statements of support for or opposition to the proposed project fall into this category. Again, comments of this type have been noted but are not used in defining the scope and content of the EIS.

Section 2.2 summarizes the comments received during the public scoping period. Most of the issues raised have a direct bearing on the NRC's analysis of potential environmental impacts.

2.2 SUMMARY OF ISSUES RAISED

As noted above, a large number of commenters expressed support for the facility. On the other hand, several individuals raised concerns regarding the construction and operation of the NEF. The following summary groups the comments received during the scoping period by technical area and issues.

2.2.1 NEPA and public participation

A commenter stated that given the level of interest in this EIS in New Mexico, a single scoping meeting in a remote location seemed inadequate. Another commenter stated that the public scoping meeting in Eunice, New Mexico, presented "no substance from LES or their supporters" but was a "really great pep rally." Another commenter stated that the local community is capable of making its own decisions and does not want non-local intervener groups interfering with decision-making. Another commenter noted that "98% of the residents of Lea County are in favor of the enrichment facility." Another commenter noted that "there are very few Nay

Sayers of the project" and most of the individuals, that the commenter has personal contact with, have "positive views" of the NEF.

Another commenter requested that the NRC include land use, transportation, geology and soils, water resources, ecology, air quality, noise, historical and cultural resources, visual and scenic resources, socioeconomics, environmental justice, public and occupational health, and waste management as topics for the EIS, and that particular attention be paid to environmental justice and waste management in the EIS and licensing process.

2.2.2 Land use and site selection

A commenter recommended that the NRC staff consult with the administrator of the Land and Water Conservation Fund (L&WCF) program in the State of New Mexico to determine any potential conflicts with existing L&WCF projects.

Several commenters suggested that the EIS should explain why LES is no longer pursuing alternative locations in Louisiana and Tennessee and the circumstances under which LES was required to withdraw their proposals in these States. Another commenter questioned why the NRC would allow LES to prey upon impoverished areas to site the NEF and noted that Eunice is the third such area that LES has approached. Another commenter noted that the United States Enrichment Corporation (USEC) was previously interested in Lea County for uranium enrichment using the Atomic Vapor Laser Isotope Separation (AVLIS) process in 1998 to 1999, but the project was canceled when AVLIS was proven to be unfeasible. The commenter felt that siting the project in Lea County would be more feasible and welcomed by the community.

2.2.3 Need

Several commenters raised concerns over the need for the facility. One commenter asked the NRC to explain (with accompanying facts and figures) where the need is for enriched uranium. Another commenter stated that the EIS must fully analyze the need for the proposed facility "in the light of the existing uranium enrichment capacity, which is meeting the domestic U.S. nuclear power plant requirements." A commenter stated that the United States needs the LES NEF to help ensure national energy security by having a strong nuclear energy program nationwide.

2.2.4 Alternatives

Several commenters stated that the EIS should address all environmental impacts of a range of reasonable alternatives, including the no-action alternative. A commenter stated that Lea County should consider alternative (i.e., safer) economic development projects other than the proposed action. Commenters stated that the no-action alternative in the EIS should consider the nonproliferation merits of using downblended low enriched uranium fuel from U.S. and Russian surplus highly enriched uranium. In addition, the EIS should add an alternative that increases the quantity and pace of downblending the surplus highly enriched uranium into reactor fuel. For the proposed action, the NRC should compare the generation of additional

depleted uranium tails from the proposed action to the no-action alternative. A commenter stated that, in addition to the no-action and proposed action alternatives, another alternative of "storage of up to 15,727 uranium byproduct cylinders (UBCs) beyond the operational lifetime of the facility must be fully analyzed." The commenter emphasized that this alternative is reasonable because "LES has made no other arrangements for the materials and wastes contained in those UBCs," and no existing disposal option for the wastes exists. Another commenter suggested that windmills or other alternative power generators be considered as alternatives in the draft EIS.

2.2.5 Ecology, geology, emissions, soil and water resources

Ecology: Several commenters expressed concerns that the construction and operation of the facility may have an undue impact on birds, other wildlife, and habitat in New Mexico. A commenter stated the EIS should consider the impacts to imperiled species such as the lesser prairie chicken, sand dune lizard, black-tailed prairie dogs, black-footed ferret, mountain plover, swift fox, ferruginous hawk, burrowing owl, and northern aplomado falcon. Another commenter expressed concern over the "unintentional habitat" that would be created by effluents and process cooling water that could attract and potentially harm local wildlife. Another commenter was concerned that local dove and quail could become contaminated due to the facility. Another commenter expressed concern about the adequacy of the LES Environmental Report as it pertains to local wildlife resources like sand dune lizards and the lesser prairie chicken. Another commenter was concerned with the potential for bioaccumulation in the foodchain resulting from the proposed facility.

Geology, emissions, and soil: Several commenters expressed concern over the long-term effects of any emissions (particularly gaseous) or contaminated soil (i.e., radioactive dust) being transported offsite. A number of commenters felt that the construction and operation of the proposed facility would be hazardous to the local community due to soil contamination similar to the contamination from the Paducah and Portsmouth facilities operations. A commenter stated that the EIS must fully examine the effects of the continuous releases of small amounts of uranium and other materials in the air, including the possible large releases of these materials in the case of a significant accident. Another commenter suggested those impacts from the treated effluent basin such as fugitive dust and monitoring must be included in the EIS. Another commenter suggested that the NRC must review the geology of the site. Another commenter questioned the location of the facility in one of the largest karstland.

Several commenters requested that the NRC consider the potential impact of air emissions on the health and safety of New Mexico and Texas residents. Several commenters requested that the NRC include a thorough examination of the potential impact to human health and the environment from radioactive dust storms. A commenter stated that the EIS should evaluate the effects from air releases traveling beyond 50 miles due to the persistent winds in the region. The commenter further suggested that any environmental studies should include the high prevailing southerly winds that could quickly spread emissions.

Water resources: Several commenters expressed concern over the long-term effects of any liquids being transported offsite. A commenter noted that the facility would not have a serious impact on existing water supplies or users and submitted a letter that summarized the county's

water-use audit demonstrating this conclusion. On the other hand, several commenters expressed concerns about the water volumes that are expected to be used by the proposed facility (e.g., volumes, consumptive uses, and associated water rights) and future usage with anticipated growth in the population. A commenter stated that the EIS must analyze the total water use, not just the consumption, as the total amount of water used would not be available for other domestic uses of the Hobbs and Eunice communities. According to this commenter, this analysis must include impacts of peak water use, as well as the amounts of water use based on the LES NEF design. Another commenter stated that the EIS should address all impacts on water levels in the Ogallala Aquifer, as well as for the cities of Hobbs and Eunice arising from the facility's proposed use of cooling water from municipal water supplies that draw upon the Ogallala Aquifer.

A number of commenters felt that the construction and operation of the proposed facility would be hazardous to the local community due to groundwater contamination. Commenters expressed concern about the impact of the proposed facility on the groundwater, specifically the Ogallala Aquifer over which the facility would be built. A commenter suggested that the NRC must review the hydrology of the site, as well as the relation of area aquifers to larger, regional aquifers such as the Ogallala Aquifer.

Several commenters expressed doubt that the values given on water usage from the county/local governments, water-resource boards, and LES are correct, and that the declining water level in the Ogallala Aquifer was a concern. Another commenter stated that LES has admitted to lying about the proposed facility's air and water emissions, and LES' questionable credibility puts the Ogallala Aquifer water supply in jeopardy.

A commenter stated that the EIS must consider the possibility that the containers in which LES plans to store depleted UF_6 may leak and allow contaminants to seep into groundwater. The commenter further noted that the NRC must thoroughly evaluate the LES proposed wastewater containment system and its ability to prevent the permeation of contaminated groundwater in the future. Another commenter stated the EIS must analyze all possible water discharges points and their capacity. Another commenter expressed concerns of contamination by the onsite "open contamination water pit." The commenter questioned the construction of the pit and the type of liner. Ingestion from these holding ponds should be evaluated, should pond overflow occur. Uncertainty was expressed as to the resources available to clean up any contamination.

2.2.6 Socioeconomics

Economic benefit: A number of commenters stated that the proposed facility would have a positive and beneficial economic impact on the community by bringing economic diversity and stability to the local area. A commenter stated that the project "will have a positive impact, not only on our economy in Lea County, but for the whole United States." Another commenter felt that it was necessary to bring in a variety of industries to keep jobs local for future generations and that the NEF would help stem the county's long-standing "brain-drain." Another commenter felt "this project and the many benefits that it will bring to the people of Lea County is very exciting." Commenters noted that "by supporting the construction of this facility, they were in reality, supporting the creation of 210 permanent jobs...[and] 400-800 short-term construction

jobs that will provide an estimated payroll of $170 million." Another commenter noted that the additions of these employees and families "would give needed stability and growth to the area."

One U.S. Senator from New Mexico stated support for the proposed project because it would provide economic opportunity for southeastern New Mexico. Local officials from Hobbs submitted a resolution supporting efforts to locate the NEF in southeastern New Mexico, citing economic benefits that include stability, growth, job creation, and industry diversification. Other local politicians stated that they expected the LES to be a good corporate neighbor that would add to the quality of life in the area (e.g., LES donated money for the development of a safe playground).

Other commenters expressed reservations concerning the economic benefits of the proposed facility. A commenter stated concerns about the promise of jobs being used as motivation for public support of the NEF. Another commenter stated that many residents would move from Lea County before the NEF opens. Another commenter stated that the strengthened local economy as a result of the presence of the LES NEF is not enough reason to outweigh the possible cost in lives due to potential environmental contamination.

Another commenter requested the EIS to include an extensive and thorough examination of the number and quality of local jobs and to present a detailed job breakdown by number of local workers versus "imported" workers and by "worker upward mobility." Other commenters requested that the EIS specify work titles and descriptions of duties, qualifications required, salary per job title, and quantity of workers. Another commenter also suggested the need for the economic multiplier that the LES NEF would add to the local economy. Also, the same commenter requested that the EIS investigate and document the number and nature of the potential jobs that LES can realistically offer the citizens of Lea County to establish any true economic benefits. Another commenter stated that businesses would have difficulty recruiting new employees. Another commenter questioned whether the revenue and product generated by the proposed facility would be staying within the United States or would it be sent overseas.

Tax and bonds: A commenter questioned why Lea County should provide tax breaks, municipal bonds, and other public funds for this project given both the questionable world market demand for enriched uranium and the financial health of at least one of its major partners, British Nuclear Fuels, Ltd. A commenter inquired as to what would be the impact of the $1.8 billion bond agreement on Lea County if the project shuts down early or never opens. In addition, another commenter suggested that "the facility is not economical in that it can only operate if it has the $1.8 billion Industrial Revenue Bonds," and this fact must be included in the EIS. A commenter proposed a "socioeconomic alternative" (i.e., an across-the-board tax cut for the businesses and people of Lea County) that would give the people and businesses of Lea County a $435 million tax break (instead of giving LES a $180 million tax break) and would provide Lea County with "significantly more long-term jobs and free enterprise economic development."

Property value: A commenter stated concern that, as a landowner of several properties, values for property could be adversely affected by a problem at the proposed LES NEF or by unintentional contamination of land or water resources. Another commenter suggested that the EIS should discuss the effects of effluents and potential accidents on the local property values.

Foreign-Trade Zone: A commenter questioned whether LES would be utilizing the Foreign-Trade Zone and possibly applying for a sub-zone. If so, the commenter asked if this information should be included in the EIS.

Public Service: A commenter expressed doubt that the local communities could handle the increased public service demands from an increased population.

2.2.7 Environmental justice

Several commenters suggested a detailed environmental justice review including an analysis of the effects on minority and low-income populations. Any disproportionate effect of minority or low-income populations should be subject to further investigation. A commenter stated that the EIS should examine all environmental justice issues, including the racial and economic makeup, expected composition of the workforce, and whether any claim to the land is held by any Indian tribes in the area around the proposed facility.

Another commenter representing the National Association for the Advancement of Colored People stated that they "unequivocally and without reservation support the construction...[and] operation of the Louisiana Energy Services plant." Another commenter stated that the local communities of Eunice, Hobbs, and Jal are ignorant concerning the proposed facility. The commenter further noted that because over one-third of the population is Mexican-American and do not understand English, information about the plant is not often comprehended and accepted. Another commenter noted that LES and NRC staff have shown concern regarding the impact of the proposed NEF on local minority populations. The commenter noted that they would be sharing this information with the minority population.

2.2.8 Transportation

Several commenters expressed concerns regarding transportation to and from the proposed facility. A commenter stated that the EIS must consider the "wide variety of routes" and the impacts of the projected shipments of up to 16,000 UBCs. Another commenter voiced concern that all transportation routes should be evaluated to determine impacts (including environmental justice) on the public along the full length of those transport routes. A commenter expressed concern over the long-term road conditions of NM Highway 123 due to Waste Control Specialists (WCS), the landfill, and NEF traffic. The commenter noted surrounding roads are heavily used by pass-through recreational traffic (e.g., traffic to casinos and natural attractions).

Commenters stated that the EIS should include a precise, detailed analysis of the increased hazards of transporting UF_6 over great distances, especially to a site accessible only by two-lane highways. A commenter expressed concern about the deteriorating conditions of some New Mexico roadways and the resulting high incidence of accidents that represent safety-related issues and aspects that need to be addressed.

A commenter stated that LES must demonstrate that it has the full understanding and support of the Western Interstate Energy Board, which is responsible for communication and cooperation among its membership with specific regard to the development and management of

nuclear energy projects. The commenter felt this was important because the LES project involves the interstate transport of nuclear waste materials.

2.2.9 Waste management

General waste management: A commenter expressed concern that it is misleading to describe the LES project only as a processing facility—in reality, it is a nuclear waste storage facility. Another commenter stated that the EIS must include a complete and thorough investigation into gaseous, liquid, and solid waste production, treatment, and disposal at the proposed facility. Another commenter asked what would happen to worn out parts, tools, solvents, chemicals, etc. that are radioactive and whether these contaminated items would be disposed onsite. The same commenter also asked how much the cleanup of the LES plant would cost and objected to any nuclear waste being disposed of in landfills. Another commenter suggested that low-level waste from the proposed LES NEF could be sent to WCS.

Depleted uranium tails disposal: While several commenters felt that the wastes are manageable, some commenters stated opposition to the approval of the LES' application because "no place has been approved to take the waste product." A commenter asked why more waste should be added to waste already existing with no means of disposal. Another commenter expressed concern about the lack of a final disposal alternative for the depleted uranium tails that could lead to environmental exposure of radioactive materials in the long term. Another commenter proposed a condition for license approval to include final disposal of all waste must be out of State. Another commenter inquired as to where the waste would be stored and how soon it would be moved out of the State. Another commenter stated that the local community should mandate an agreement with LES prior to construction that any waste would be promptly removed. Another commenter stated that LES attempted to misrepresent to the public the amount of waste that would be stored in Lea County and, for this reason, LES' application for a license should be denied. Another commenter stated the NRC should evaluate waste characteristics of depleted uranium relative to transuranic waste in the scope of the EIS. Another commenter stated that "legitimate questions have been raised regarding the safe and secure storage and ultimate removal from New Mexico of the leftover uranium hexafluoride material, or tails, from the enrichment operation over the lifetime of the plant's operation." Another commenter stated that the EIS should examine the veracity of LES' statement that waste would be shipped offsite to a licensed disposal facility. In addition, the EIS should examine all additional environmental, radiological, and chemical impacts from construction and operation of a possible additional UF_6 conversion facility for ultimate disposal nearby or even at the proposed LES site. Another commenter expressed concern about what would ultimately happen to the waste at the proposed LES NEF and what assurances exist that the waste would not be deconverted and stored at WCS. Another commenter stated the NRC must consider the effects of using the depleted uranium in warfare, a potential application. Another commenter suggested that the tails generated should be seen as a resource rather than as a waste product and should be used to entice another company to locate a deconversion facility adjacent to the LES NEF.

Commenters stated that the NRC must analyze the impacts of the two disposal options for UBCs. These options include 1) establishment of a private conversion facility for processing and disposal of the converted waste in "an exhausted uranium mine" and 2) having the UBCs taken by the U.S. Department of Energy. In addition, the commenters stated that the EIS must

analyze the plausibility of these options much more extensively than was done in the LES Environmental Report. The commenters also suggested that the EIS analyze the costs of indefinite waste storage at the LES facility. Another commenter suggested the EIS must analyze the financial assurance of disposition of the wastes.

Life expectancy/safety of waste containers: Commenters inquired as to the life expectancy of waste storage containers that may be used at the proposed LES NEF and expressed concern about their safety.

2.2.10 Cumulative Impacts

Several commenters requested that the cumulative impacts of other activities such as oilfield operation be considered in the EIS and raised concern over the cumulative impacts of continued generation of depleted uranium. A commenter expressed concern that LES would not be able to contain radioactive contaminants in soil and plant life due to past and possibly ongoing contamination in southeast New Mexico. Another commenter stated that the environmental evaluation should include a consideration of long-term and cumulative environmental effects of the radioactive and hazardous waste created by the NEF, not excluding effects at any of the disposal or processing sites around the country. Commenters stated that in its EIS, the NRC should take into account past abuses and acts of malfeasance at domestic uranium enrichment facilities in determining the potential public health impact of the proposed plant. Commenters expressed concerns related to the Paducah and Portsmouth facilities' operations that involved cancer risks to workers and the public, impacts to wildlife, and adverse impacts on aquifer and groundwater, which they stated have damaged the environment and human health and safety. This damage would also occur at the proposed facility.

A commenter stated that LES must demonstrate that it has the full understanding and support of the Western Interstate Energy Board, which is responsible for communication and cooperation among its membership with specific regard to the development and management of nuclear energy projects. The commenter felt this was important because the proposed project involves potential impacts to the economies of both regional States and the Nation. Another commenter stated that the environmental analysis should include assessment of cumulative regional impacts on the sand dune lizards and the lesser prairie chicken. Commenters stated that the EIS must conduct a full investigation into the demographic makeup of the area near the proposed NEF, taking into account other nuclear facilities in the area near the proposed NEF such as the Waste Isolation Pilot Plant (WIPP) and the WCS toxic and radioactive waste repository and their cumulative effect on public health and ecological integrity. Another commenter noted two major accidents in Carlsbad and that they needed to be considered in the EIS analysis. The effects of such accidents at LES should be considered along with mitigation measures to prevent them.

2.2.11 Decommissioning

A commenter suggested that the EIS should include a detailed disposition and closure plan for the site, supported by a cost analysis.

2.2.12 Safety and Risk

Uranium hexafluoride (UF_6): A commenter asked who would regulate safety at the proposed facility. Another commenter inquired about the volatility of UF_6, how much would be onsite at any given hour of the day, and the worst-case scenario if an accident with UF_6 should occur. Another commenter proposed a condition for license approval to include limiting the amount and time of UF_6 storage onsite.

Risk and public health: Several commenters felt that the risks are manageable. One commenter stated that the uranium enrichment industry used lessons learned from past and current U.S. enrichment facilities to improve the safety and operation of the LES NEF. Another commenter stated that the local community would be safe by ensuring that LES meets the regulatory requirements. Another commenter noted that the local community demonstrated due diligence during the licensing of WCS and that this was being repeated for the LES NEF. Having worked at large-scale nuclear and industrial facilities, a commenter felt the anti-NEF groups were exaggerating the dangers. Several commenters who toured the gas centrifuge facility in Europe (Almelo, Netherlands) stated that the technology is clean and safe for workers, the public, and the environment. Another commenter stated that the NEF "would not pose a threat to their [the public] health and safety, that it would not harm the environment, and that they [the public] would not be left with the plant's wastes." Another commenter noted that the proposed enrichment facility would be "tremendous addition to our technology." Another commenter stated LES "take safety and security very seriously based on what they have heard about LES and the uranium enrichment plant."

A number of commenters felt that the construction and operation of the proposed facility would be hazardous to the local community due to possible radiation exposure. A commenter stated that the EIS should address all impacts to public health arising from the increase in routine and accidental radioactive emissions to the air and water as a result of the operation of the proposed facility. This analysis should consider work by Dr. John Gofman and numerous other scientists showing that low-level radiation is a significant contributor to deaths from heart disease and cancer. Another commenter stated that the EIS should include a complete investigation into potential worker and public exposure to toxic and radioactive materials resulting from NEF operations. Another commenter suggested that the draft EIS should address the risks from effluent releases as latent cancer fatalities per 10,000 people. Another commenter suggested that the EIS should include a plan for maintaining and updating workers' records in a secure and public location where NEF employees would be able to access their radiation records.

Accident analysis: A commenter stated that the EIS should address all impacts on public health and the environment arising from a severe accident and the impacts. Another commenter expressed concern that the accident analysis would not be properly completed and requested that the following be included: 1) risk of fire, 2) impacts beyond a 50-mile radius, 3) evaluation of impacts from all transportation paths (feed, tails, wastes) including collisions with local oil and gas transport trucks, and 4) identification of emergency response preparedness for Lea County and all transportation routes. Another commenter stated that the LES NEF would not be as safe as some individuals are saying and expressed the concern that industries want to take shortcuts in operations that may lead to accidents.

Another commenter inquired about what type of evacuation plan and procedure is in place in the case of an accident at the plant site, and how would information about these emergency evacuations be disseminated. Another commenter stated that the EIS should address the impacts of any emergency response measures such as relocation of the population. Another commenter stated that the NRC must promise to shut down the proposed facility if any effluent releases exceed regulatory limits. Another commenter suggested that an impartial (i.e., non-LES) expert be on the site at all times to provide emergency information. This commenter also stated that medical and emergency personnel should immediately start getting the necessary background training that would enable them to handle radiation situations now, not later.

2.2.13 Nonproliferation and security

Several commenters expressed concern that advanced nuclear technology used at the LES NEF could be spread to other unfriendly governments as happened at Urenco. Another commenter expressed concern that there is "massive secrecy and cover up regarding the Urenco involvement in the spread of gas centrifuge uranium enrichment technology to Iraq, Pakistan, Iran, Libya, and North Korea which extends deep, far, and wide regarding nuclear proliferation and our national security problem." For this reason, the commenter suggested that a thorough congressional investigation of Urenco and LES is desperately needed and that Congress should direct the NRC to withhold granting LES an operating license until that investigation is completed.

Several commenters stated that Urenco, Ltd. has been implicated in nonproliferation and security breaches and wondered what is going to be done to ensure this kind of security breach does not happen at the LES NEF. A commenter requested that "given the track records of both major backers of this project," the EIS should provide "a detailed review of the national security and environmental policies of all the corporate participants in this project." Another commenter expressed concern that Lea County leaders were unaware of these activities at Urenco, Ltd. Another commenter stated that the EIS should consider whether Urenco would likely adhere to U.S. national security policy that actively discourages the proliferation of nuclear technology worldwide.

Another commenter noted that local law enforcement was involved in the planning of security at the WIPP and it also intends to be involved in the planning of security at the proposed facility. Another commenter stated that the EIS should examine all impacts arising from increased security risks and tasks associated with the construction and operation of the proposed LES NEF.

2.2.14 Terrorism

A commenter stated that accident consequences and risks should include terrorist attacks like September 11, 2001, regardless of the probability of such an event. Another commenter suggested the EIS include an analysis of the amount of gas and radiation that would be released into the atmosphere in the event of a 9/11-type terrorist catastrophe. Another commenter expressed concern that the LES NEF may "open up our country for controversy and risk for terror attacks" due to the nuclear materials and activities.

2.2.15 Credibility

Several commenters stated that LES's officials have been straightforward, honest and complete in their responses with groups, the public and individuals. On the other hand, a commenter stated that LES seems to be less than truthful in their part of the licensing process. The commenter stated because LES has a record of polluting, future accountability should be an important factor in deciding whether the NEF should be constructed in a southeast New Mexico location. Another commenter suggested that LES needs to address why the operating license at the Almelo, Netherlands, facility was revoked twice and to discuss other multiple violations at the plant. Another commenter suggested that Urenco, Ltd. should open their books for audit.

Another commenter stated that LES was deceptive and misrepresented facts to local residents about air emissions, water contamination, waste disposal of tails, and planning for potential accidents. The same commenter questioned why the NRC would grant a license to a company that is both deceptive and incompetent to operate the proposed NEF.

Another commenter stated that NRC officials currently in charge of the licensing process are "ethically challenged and should be replaced" because they are not responding to LES' less than truthful statements.

3. SUMMARY AND CONCLUSIONS

3.1 SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT AND SUMMARY OF ISSUES TO BE ADDRESSED

NEPA (Public Law 91-90, as amended), and the NRC's implementing regulations for NEPA (10 CFR Part 51), specify in general terms what should be included in an EIS prepared by the NRC staff. Regulations established by the Council on Environmental Quality (40 CFR Parts 1500-1508), while not binding on the NRC staff, provide useful guidance. The NRC staff has also prepared environmental review guidance to its staff for meeting NEPA requirements associated with licensing actions ("Environmental Review Guidance for Licensing Actions Associated with Office of Nuclear Material Safety and Safeguards (NMSS) Programs", NUREG -1748).

Pursuant to 10 CFR 51.71(a), in addition to public comments received during the scoping process, the contents of the draft EIS will depend in part on the environmental report. In accordance with 10 CFR 51.71(b), the draft EIS will consider major points of view and objections concerning the environmental impacts of the proposed action raised by other Federal, State, and local agencies, by any affected Indian tribes, and by other interested persons. Pursuant to 10 CFR 51.71(c), the draft EIS will list all Federal permits, licenses, approvals, and other entitlements which must be obtained in implementing the proposed action, and will describe the status of compliance with these requirements. Any uncertainty as to the applicability of these requirements will be addressed in the draft EIS.

Pursuant to 10 CFR 51.71(d), the draft EIS will include a consideration of the economic, technical, and other benefits and costs of the proposed action and alternatives to the proposed action. In the draft analysis, due consideration will be given to compliance with environmental quality standards and regulations that have been imposed by Federal, State, regional, and local agencies having responsibilities for environmental protection. The environmental impact of the proposed action will be evaluated in the draft EIS with respect to matters covered by such standards and requirements, regardless of whether a certification or license from the appropriate authority has been obtained. Compliance with applicable environmental quality standards and requirements does not negate the requirement for NRC to weigh all environmental effects of the proposed action, including the degradation, if any, of water quality, and to consider alternatives to the proposed action that are available for reducing adverse effects. While satisfaction of NRC standards and criteria pertaining to radiological effects will be necessary to meet the licensing requirements of the Atomic Energy Act, the draft EIS will also, for the purposes of NEPA, consider the radiological and non-radiological effects of the proposed action and alternatives.

Pursuant to 10 CFR 51.71(e), the draft EIS will normally include a preliminary recommendation by the NRC staff with respect to the proposed action. Any such recommendation would be reached after considering the environmental effects of the proposed action and reasonable alternatives, and after weighing the costs and benefits of the proposed action.

The scoping process summarized in this report will help determine the scope of the draft EIS for the proposed facility. The draft EIS will contain a discussion of the cumulative impacts of the proposed action. The development of the draft EIS will be closely coordinated with the SER prepared by the NRC staff to evaluate the health and safety impacts of the proposed action.

The goal in writing the EIS is to present the impact analyses in a manner that makes it easy for the public to understand. This EIS will provide the basis for the NRC decision with regard to potential environmental impacts. Significant impacts will be discussed in greater detail in the EIS, and explanations will be provided for determining the level of detail for different impacts. This should allow readers of the EIS to focus on issues that were determined to be important in reaching the conclusions supported by the EIS. The following topical areas and issues will be analyzed in the EIS.

- *Public and worker safety and health*. The draft EIS will include a determination of potentially adverse effects on human health that result from chronic and acute exposures to ionizing radiation and hazardous chemicals as well as from physical safety hazards. These potentially adverse effects on human health might occur during facility construction and operation. Impacts associated with the implementation of the proposed action will be assessed under normal operation and credible accident scenarios.

- *Alternatives.* The draft EIS will describe and assess the no-action alternative and other reasonable alternatives to the proposed action. Other reasonable alternatives to the proposed action will be considered such as alternative sites, enrichment sources, or technological alternatives to the proposed centrifuge technology.

- *Waste management.* The draft EIS will discuss the management of wastes, including byproduct materials, generated from the construction and operation of the NEF to assess the impacts of generation, storage, and disposition. Onsite storage of wastes will also be included in this assessment.

- *Depleted uranium disposition.* The draft EIS will address concerns about the depleted uranium hexafluoride material, or tails, resulting from the enrichment operation over the lifetime of the proposed plant's operation. These concerns include the safe and secure storage and ultimate removal of this material from New Mexico, and potential conversion of UF_6 to U_3O_8 and ultimate disposition.

- *Water resources.* The draft EIS will assess the potential impacts on groundwater quality and water use due to the implementation of the proposed action.

- *Geology and seismicity.* The draft EIS will describe the geologic and seismic characteristics of the proposed NEF site. Evaluation of the potential for earthquakes, ground motion, soil stability concerns, surface rupturing, and any other major geologic or seismic considerations that would affect the suitability of the proposed site will be addressed in the SER rather than in the draft EIS.

- *Compliance with applicable regulations.* The draft EIS will present a listing of the relevant permits and regulations that are believed to apply to the proposed NEF. These would include air, water, and solid waste regulations and disposal permits.

- *Air quality*. The draft EIS will make determinations concerning the meteorological conditions of the site location, the ambient air quality, and the contribution of other sources. In addition, the draft EIS will assess the impacts of the NEF's construction and operation on the local air quality.

- *Transportation.* The draft EIS will discuss impacts associated with the transportation of construction material, centrifuges, and feed and tails during both normal transportation and transportation under credible accident scenarios. The impacts on local transportation routes due to workers, large vehicles delivering needed equipment and materials, and vehicles removing waste from the proposed facility will be evaluated in the draft EIS.

- *Accidents.* The draft EIS will analyze the potential environmental impacts resulting from credible accidents at the NEF. The SER will assess the impacts associated with credible accidents at the proposed NEF, both from natural events and human activities. Based on the analyses, the EIS will summarize the potential environmental impacts resulting from credible bounding accidents at the proposed facility.

- *Land use.* The draft EIS will discuss the potential impacts associated with the changes in land use from predominately rangeland to industrial.

- *Socioeconomic impacts.* The draft EIS will address the demography, the economic base, labor pool, housing, utilities, public services, education, recreation, and cultural resources as impacted by NEF. The hiring of new workers from outside the area could lead to impacts on regional housing, public infrastructure, and economic resources. Population changes leading to changes to the housing market and demands on the public infrastructure will be assessed in the draft EIS.

- *Cost/benefits.* The draft EIS will address the potential cost/benefits of constructing and operating the NEF, and will discuss the cost/benefits of tails disposition options.

- *Cultural resources.* The draft EIS will assess the potential impacts of the proposed NEF on the historic and archaeological resources of the area and on the cultural traditions and lifestyle of Indian tribes.

- *Resource commitments.* The draft EIS will address the unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and the relationship between local, short-term uses of the environment and the maintenance and enhancement of long-term productivity. In addition, associated mitigative measures and environmental monitoring will be presented.

- *Ecological resources.* The draft EIS will assess the potential environmental impacts of the proposed NEF on ecological resources including plant and animal species and threatened or endangered species or critical habitat that may occur in the area. As appropriate, the assessment will include an analysis of mitigation measures to address adverse impacts.

- *Need for the facility.* The draft EIS will provide a discussion of the need for the proposed NEF and the expected benefits.

- *Decommissioning.* The draft EIS will include a discussion of facility decommissioning and associated impacts.

- *Cumulative impacts.* The draft EIS will address the potential cumulative impacts from past, present, and reasonably foreseeable activities at and near the site.

4.0 ISSUES CONSIDERED OUTSIDE THE SCOPE OF THE ENVIRONMENTAL IMPACT STATEMENT

The purpose of an EIS is to assess the potential environmental impacts of a proposed action as part of the decision-making process of an agency-in this case, a licensing decision. As noted in Section 2.2, some issues and concerns raised during the scoping process are not relevant to the EIS because they are not directly related to the assessment of potential impacts or to the decision-making process. The lack of in depth discussion in the EIS, however, does not mean that an issue or concern lacks value. Issues beyond the scope of the EIS either may not yet be ripe for resolution or are more appropriately discussed and decided in other venues.

Some of these issues raised during the public scoping will not be addressed in the EIS. Major categories of these issues not analyzed in detail in the EIS include nonproliferation concerns, terrorism, security and safety issues, and credibility. The Commission has held that NRC staff is not required to consider terrorism in its EISs. In *The Matter of Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), 56 NRC 340 (2002), the Commission held that NRC is not required to consider terrorism in EISs. The Commission indicated, "the possibility of a terrorist attack … is speculative and simply too far removed from the natural or expected consequences of agency action to require a study under NEPA."

Some of these issues raised during the public scoping process for the proposed facility are outside the scope of the draft EIS, but they will be analyzed in the SER. For example, health and safety issues will be considered in detail in the SER prepared by NRC staff for the proposed action and will be summarized in the EIS. The draft EIS and the SER are related in that they may cover the same topics and may contain similar information, but the analysis in the draft EIS is limited to an assessment of potential environmental impacts. In contrast, the SER primarily deals with safety evaluations and procedural requirements or license conditions to ensure the health and safety of workers and the general public. The SER also covers other aspects of the proposed action such as demonstrating that the applicant will provide adequate funding for the proposed facility in compliance with NRC's financial assurance regulations.

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Federal Register

NUCLEAR REGULATORY COMMISSION

Notice of Intent To Prepare an Environmental Impact Statement for the Proposed LES Gas Centrifuge Uranium Enrichment Facility

ACTION: Notice of Intent (NOI).

SUMMARY: Louisiana Energy Services (LES) submitted a license application on December 12, 2003, that proposes the construction, operation and decommissioning of a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico. The U.S. Nuclear Regulatory Commission (NRC), in accordance with the National Environmental Policy Act (NEPA) and its regulations at 10 CFR part 51, announces its intent to prepare an Environmental Impact Statement (EIS). The EIS will examine the potential environmental impacts of the proposed LES facility.

DATES: The public scoping process required by NEPA begins with publication of this NOI and continues until March 18, 2004. Written comments submitted by mail should be postmarked by that date to ensure consideration. Comments mailed after that date will be considered to the extent practical.

The NRC will conduct a public scoping meeting to assist in defining the appropriate scope of the EIS, including the significant environmental issues to be addressed. The meeting date, times and location are listed below:

- *Meeting date:* March 4, 2004.
- *Meeting location:* Eunice Community Center, 1115 Avenue I, Eunice, NM.
- *Scoping meeting time:* 7 p.m. to 10 p.m.

ADDRESSES: Members of the public are invited and encouraged to submit comments to the Chief, Rules and Directives Branch, Mail Stop T6–D59, U.S. Nuclear Regulatory Commission, Washington, DC 20555–0001. Please note Docket No. 70–3103 when submitting comments. Due to the current mail situation in the Washington, DC area, commentors are encouraged to send comments electronically to *LES_EIS@nrc.gov* or by facsimile to (301) 415–5398, ATTN.: Melanie Wong.

FOR FURTHER INFORMATION CONTACT: For general or technical information associated with the license review of the LES application, please contact: Tim Johnson at (301) 415–7299. For general information on the NRC NEPA process, or the environmental review process related to the LES application, please contact: Melanie Wong at (301) 415–6262.

Information and documents associated with the LES project, including the LES license application (submitted on December 12, 2003), are available for public review through our electronic reading room: *http://www.nrc.gov/reading-rm/adams.html.* Documents may also be obtained from NRC's Public Document Room at U.S. Nuclear Regulatory Commission Headquarters, 11555 Rockville Pike (first floor), Rockville, Maryland.

SUPPLEMENTARY INFORMATION:

1.0 Background

LES submitted a license application and an environmental report for a gas centrifuge uranium enrichment facility to the NRC on December 12, 2003. The NRC will evaluate the potential environmental impacts associated with LES enrichment facility in parallel with the review of the license application. This environmental evaluation will be documented in draft and final Environmental Impact Statements in accordance with NEPA and NRC's implementing regulations at 10 CFR part 51.

2.0 LES Enrichment Facility

The LES facility, if licensed, would enrich uranium for use in manufacturing commercial nuclear fuel for use in power reactors. Feed material would be natural (not enriched) uranium in the form of uranium hexafluoride (UF_6). LES proposes to use centrifuge technology to enrich isotope

uranium-235 in the uranium hexafluoride to up to 5 percent. The centrifuge would operate at below atomospheric pressure. The capacity of the plant would be up to 3 million separative work units (SWU) (SWU relates to a measure of the work used to enrich uranium). The enriched UF_6 would be transported to a fuel fabrication facility. The depleted UF_6 would be stored on site until it can be sold or disposed of commercially, or by the Department of Energy.

3.0 Alternatives To Be Evaluated

No-Action—The no-action alternative would be to not build the proposed LES gas centrifuge uranium enrichment facility. Under this alternative, the NRC would not approve the license application. This serves as a baseline for comparison.

Proposed action—The proposed action involves the construction, operation, and decommissioning of a gas centrifuge uranium enrichment facility located near Eunice, NM. The applicant would be issued an NRC license under the provisions of 10 CFR parts 30, 40, and 70.

Other alternatives not listed here may be identified through the scoping process.

4.0 Environmental Impact Areas To Be Analyzed

The following areas have been tentatively identified for analysis in the EIS:

- *Land Use:* Plans, policies and controls;
- *Transportation:* Transportation modes, routes, quantities, and risk estimates;
- *Geology and Soils:* Physical geography, topography, geology and soil characteristics;
- *Water Resources:* Surface and groundwater hydrology, water use and quality, and the potential for degradation;
- *Ecology:* Wetlands, aquatic, terrestrial, economically and recreationally important species, and threatened and endangered species;
- *Air Quality:* Meteorological conditions, ambient background, pollutant sources, and the potential for degradation;
- *Noise:* Ambient, sources, and sensitive receptors;
- *Historical and Cultural Resources:* Historical, archaeological, and traditional cultural resources
- *Visual and Scenic Resources:* Landscape characteristics, manmade features and viewshed;
- *Socioeconomics:* Demography, economic base, labor pool, housing, transportation, utilities, public services/facilities, education, recreation, and cultural resources;
- *Environmental Justice:* Potential disproportionately high and adverse impacts to minority and low-income populations;
- *Public and Occupational Health:* Potential public and occupational consequences from construction, routine operation, transportation, and credible accident scenarios (including natural events);
- *Waste Management:* Types of wastes expected to be generated, handled, and stored; and
- *Cumulative Effects:* Impacts from past, present and reasonably foreseeable actions at, and near the site(s).

This list is not intended to be all inclusive, nor is it a predetermination of potential environmental impacts. The list is presented to facilitate comments on the scope of the EIS. Additions to, or deletions from this list may occur as a result of the public scoping process.

5.0 Scoping Meeting

One purpose of this NOI is to encourage public involvement in the EIS process, and to solicit public comments on the proposed scope and content of the EIS. The NRC will hold a public scoping meeting in Eunice, New Mexico, to solicit both oral and written comments from interested parties.

Scoping is an early and open process designed to determine the range of actions, alternatives, and potential impacts to be considered in the EIS, and to identify the significant issues related to the proposed action. It is intended to solicit input from the public and other agencies so that the analysis can be more clearly focused on issues of genuine concern. The principal goals of the scoping process are to:

- Ensure that concerns are identified early and are properly studied;
- Identify alternatives that will be examined;
- Identify significant issues that need to be analyzed;
- Eliminate unimportant issues; and
- Identify public concerns.

The scoping meeting will begin with NRC staff providing a description of the NRC's role and mission. A brief overview of the licensing process will be followed by a brief description of the environmental review process. The bulk of the meeting will be allotted for attendees to make oral comments.

6.0 Scoping Comments

Written comments should be mailed to the address listed above in the **ADDRESSES** section.

The NRC staff will make the scoping summaries and project-related materials available for public review through our electronic reading room: *http://www.nrc.gov/reading-rm/adams.html*. The scoping meeting summaries and project-related materials will also be available on the NRC's LES Web page: *http://www.nrc.gov/materials/fuel-cycle-fac/lesfacility.html* (case sensitive).

7.0 The NEPA Process

The EIS for the LES facility will be prepared according to the National Environmental Policy Act of 1969 and the NRC's NEPA Regulations at 10 CFR part 51.

After the scoping process is complete, the NRC and it's contractor will prepare a draft EIS. A 45-day comment period on the draft EIS is planned, and public meetings to receive comments will be held approximately three weeks after distribution of the draft EIS. Availability of the draft EIS, the dates of the public comment period, and information about the public meetings will be announced in the **Federal Register**, on NRC's LES Web page, and in the local news media when the draft EIS is distributed. The final EIS will incorporate public comments received on the draft EIS.

Signed in Rockville, MD this 16th day of January, 2004.

For The Nuclear Regulatory Commission.

Lawrence E. Kokajko,

Chief, Environmental and Performance Assessment Branch, Division of Waste Management, Office of Nuclear Material Safety and Safeguards.

[FR Doc. E4–179 Filed 2–3–04; 8:45 am]

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APPENDIX B - CONSULTATION LETTERS

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 26, 2004

Mr. Samuel Cata
Tribal Liaison
Historic Preservation Division
228 East Palace Ave.
Santa Fe, NM 87501

SUBJECT: STATUS OF SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Mr. Cata:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico. The proposed enrichment facility covers an area of approximately 543 acres.

In accordance with NRC regulations at 10 CFR Part 51 and the National Environmental Policy Act, the NRC staff is preparing an Environmental Impact Statement on the proposed facility which will assess the potential impacts of the proposed facility on the historic and archaeological resources of the area and on the cultural traditions and lifestyle of Indian tribes. In addition, the NRC staff will develop a Memorandum of Agreement (Agreement) with the New Mexico State Historic Preservation Officer (SHPO), the New Mexico State Land Office, Indian tribes and LES to ensure that the proposed action is undertaken in accordance with the requirements of the Section 106 consultation process of the National Historic Preservation Act.

On May 18, 2004, Ms. Jan Biella (Deputy SHPO) recommended contacting you as the Governor appointed Tribal Liaison to discuss the proposed project and determine which Indian tribes should be contacted. On June 4, 2004, the NRC staff provided you information related to the Section 106 consultation process including NRC letters initiating the Section 106 consultation process with the affected Indian tribes. We are currently in the process of developing the abovementioned Agreement and a Treatment Plan, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects.

We would very much appreciate your providing any comments you may have on the proposed project in a timely manner. If you have any questions or concerns, please do not hesitate to contact me at (301) 415-6262.

Sincerely,

Melanie Wong

Melanie Wong, Project Manager
Environmental and Low-Level Waste Section
Division of Waste Management
and Environmental Protection
Office of Nuclear Material Safety
and Safeguard

Docket 70-3103

cc: Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

The Honorable Clifford McKenzie, Chairman
Kiowa Tribe of Oklahoma
P.O. Box 369
Carnegie, OK 73015

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Chairman McKenzie:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information regarding properties within the APE that could have traditional religious or cultural significance. *The letter also requested that you notify the NRC staff if you were concerned about any site or* object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory.

On June 2, 2004, Mr. Samuel Hernandez of the NRC staff contacted Ms. Martha Perez (Secretary), to discuss the requested information. This is a follow-up letter confirming the information provided in the telephone conversation. Ms. Perez informed Mr. Hernandez that there are no properties of cultural and traditional significance to the Kiowa Tribe of Oklahoma within the APE. If your understanding of the telephone conference between Mr. Hernandez and Ms. Perez differs from the above, please notify us as soon as possible.

The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (hereafter Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects. In the telephone conversation, Ms. Perez informed Mr. Hernandez that the Kiowa Tribe of Oklahoma would like to be a concurring party to the Agreement.

Once the Agreement and the Treatment Plan have been finalized, they will be forwarded for your review and comment. If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

for

Scott C. Flanders
Deputy Director for the Environmental and
Performance Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103

cc: The Honorable George Tahboune, Vice-Chairman
Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2004

The Honorable Wallace Coffey, Chairman
Comanche Tribe of Oklahoma
P.O. Box 908
Lawton, OK 73502

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Chairman Coffey:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information *regarding properties within the APE that could have traditional religious or cultural significance.* The letter also requested that you notify the NRC staff if you were concerned about any site or object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory.

On June 2, 2004, Mr. Samuel Hernandez of the NRC staff contacted Mr. Jimmy Arterberry (Director of Environment), to discuss the requested information. This is a follow-up letter confirming the information provided in the telephone conversation. Mr. Arterberry informed Mr. Hernandez that there are no properties of cultural and traditional significance to the Comanche Tribe of Oklahoma within the APE. If your understanding of the telephone conference between Mr. Hernandez and Mr. Arterberry differs from the above, please notify us *as soon as possible.*

The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects. In the telephone conversation, Mr. Arterberry informed Mr. Hernandez that the Comanche Tribe of Oklahoma would like to be a concurring party to the Agreement.

Once the Agreement and the Treatment Plan have been finalized, they will be forwarded for your review and comment. If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

/RA/ for

Scott C. Flanders
Deputy Director for the Environmental and
Performance Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103

cc: Jimmy Arterberry, Director of Environment
Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2004

The Honorable Alonso Chalepah, Chairman
Apache Tribe of Oklahoma
P.O. Box 1220
Anadarko, OK 73005

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Chairman Chalepah:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads. The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (hereafter Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information regarding properties within the APE that could have traditional religious or cultural significance. The letter also requested that you notify the NRC staff if you were concerned about any site or object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory. During the month of June 2004, Mr. Samuel Hernandez of the NRC staff attempted on several occasions to contact a representative of your organization to discuss the requested information but was unsuccessful.

The NRC staff extends an invitation to the Apache Tribe of Oklahoma to be a concurring party to the Agreement and Treatment Plan. If the Apache Tribe of Oklahoma has information regarding properties within the APE and would like to be a concurring party to the Agreement, please notify us as soon as possible. If a response is not received within 30 days of receipt of this letter, the NRC staff will assume that the Apache Tribe of Oklahoma does not wish to be a concurring party to the Agreement.

If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

Scott C. Flanders
Deputy Director for the Environmental and
Performance Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103

cc: Bobby Jay, Cultural Resources Officer
Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2004

Holly Houghten, Tribal Historic Preservation Officer
Mescalero Apache Tribe
P.O. Box 227
Mescalero, NM 88340

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Ms. Houghten:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads. The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (hereafter Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information regarding properties within the APE that could have traditional religious or cultural significance. The letter also requested that you notify the NRC staff if you were concerned about any site or object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory. By letter dated June 10, 2004, you stated that the NEF will not affect any sites or locations important to the Mescalero Apache Tribe culture or religion.

During the month of June 2004, Mr. Samuel Hernandez of the NRC staff attempted on several occasions to contact Ms. Naida Natchez (Historic Preservation Officer), to discuss whether the Mescalero Apache Tribe would like to be a concurring party to the Agreement but was unsuccessful. If the Mescalero Apache would like to be a concurring party to the Agreement, please notify us as soon as possible. If a response is not received within 30 days of receipt of this letter, the NRC staff will assume that the Mescalero Apache Tribe does not wish to be a concurring party to the Agreement.

If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

/Mark Thaggard for

Scott C. Flanders
Deputy Director for the Environmental and
Performance Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103

cc: Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2004

The Honorable Arturo Sinclair, Governor
Ysleta del Sur Pueblo
P.O. Box 17579
El Paso, TX 79917

SUBJECT: SECTION 106 CONSULTATION PROCESS OF THE NATIONAL HISTORIC PRESERVATION ACT FOR THE PROPOSED LOUISIANA ENERGY SERVICES NATIONAL ENRICHMENT FACILITY

Dear Governor Sinclair:

On April 27, 2004, the U.S. Nuclear Regulatory Commission (NRC) staff provided you with a copy of the Cultural Resource Inventory, which documents the cultural resources at the proposed site of the Louisiana Energy Services (LES) National Enrichment Facility (NEF). During the inventory, seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE consists of: the proposed NEF site area, including permanent and temporary building(s) footprints; parking and lay-down areas; and all site access roads.

In the letter transmitting the Cultural Resource Inventory, the NRC staff requested information regarding properties within the APE that could have traditional religious or cultural significance. The letter also requested that you notify the NRC staff if you were concerned about any site or object eligible for inclusion on the National Register of Historic Places that is not included in the Cultural Resources Inventory.

On June 2, 2004, Mr. Samuel Hernandez of the NRC staff contacted Ms. Silvia Garcia (Secretary), to discuss the requested information. This is a follow-up letter confirming the information provided in the telephone conversation. Ms. Garcia informed Mr. Hernandez that there are no properties of cultural and traditional significance to the Ysleta del Sur Pueblo within the APE. If your understanding of the telephone conference between Mr. Hernandez and Ms. Garcia differs from the above, please notify us as soon as possible.

The proposed NEF site is located on land currently owned by the State of New Mexico. However, as part of a land exchange process involving the State, Lea County, and LES, the land for the proposed NEF would be deeded to LES. This land exchange process would be considered an adverse effect to the seven prehistoric archeological sites identified. As a result of the findings of adverse effects, a draft Memorandum of Agreement (hereafter Agreement) and Treatment Plan will be developed, that outlines agreed-upon measures that LES will undertake to avoid, minimize, or mitigate any adverse effects. In the telephone conversation, Ms. Garcia informed Mr. Hernandez that the Ysleta del Sur Pueblo would like to be a concurring party to the Agreement.

Once the Agreement and the Treatment Plan have been finalized, they will be forwarded for your review and comment. If you have any questions or comments, please contact Melanie Wong, Project Manager for the environmental review of the proposed NEF, at (301) 415-6262. Thank you for your assistance.

Sincerely,

Scott C. Flanders
Deputy Director for the Environmental and
Performance Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103

cc: Section 106 Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 24, 2004

Mr. Alan Stanfill
Senior Program Analyst
Advisory Council on Historic Preservation
12136 West Bayaud Avenue, Suite 330
Lakewood, CO 80228

SUBJECT: NOTIFICATION OF INTENT TO PREPARE A MEMORANDUM OF AGREEMENT FOR THE LOUISIANA ENERGY SERVICES PROPOSED NATIONAL ENRICHMENT FACILITY

Dear Mr. Stanfill:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico. The proposed enrichment facility covers an area of approximately 543 acres. Construction activities, including permanent plant structures, temporary construction facilities, contractor parking and lay-down areas, would disturb 200 acres.

In September 2003, LES performed a cultural resource inventory of the proposed site. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the proposed site area including the permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. In addition, the undertaking is located on the land currently owned by the State of New Mexico. However, in a land exchange process, this land would be deeded to LES. This land exchange process would be considered an adverse effect to these seven sites. A copy of the cultural resources report documenting the cultural resource inventory is enclosed.

In accordance with NRC regulations at 10 CFR Part 51 and the National Environmental Policy Act, the NRC staff is preparing an Environmental Impact Statement (EIS) on the proposed facility which will assess the potential impacts of the proposed facility on the historic and archaeological resources of the area and on the cultural traditions and lifestyle of Indian tribes. The NRC staff will develop a Memorandum of Agreement (Agreement) with the New Mexico State Historic Preservation Officer, the New Mexico State Land Office and LES to ensure that the proposed action is undertaken in accordance with the requirements of Section 106 of the National Historic Preservation Act.

Pursuant to the requirements of 36 CFR 800, the NRC staff is notifying the Advisory Council on Historic Preservation (Council) of its intent to prepare the Agreement. The NRC staff recognizes that criteria exist for the Council's involvement in reviewing individual Section 106 cases. As described in Appendix A to 36 CFR 800, one of these criteria is whether the undertaking has the potential for presenting procedural problems. As discussed in the telephone conference calls on June 9, 2004 and June 22, 2004, the Agreement will address the land exchange process and its impacts on cultural resources.

Also, the NRC staff has offered Indian tribes that may be concerned with the possible effects of the proposed action on historic properties, an opportunity to participate in the Section 106 consultation process. As specified in 36 CFR 800.6, a copy of the executed Agreement will be submitted to the Council.

If you have any questions or comments, please contact Melanie Wong at (301) 415-6262.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment
Directorate
Division of Waste Management
and Environmental Protection
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3103
Enclosure: Cultural Resources Inventory
for the National Enrichment Facility (ML040930424)

cc: Service List (w/o enclosure)

MESCALERO APACHE TRIBAL HISTORIC PRESERVATION OFFICE
P.O. Box 227
Mescalero, New Mexico 88340
Phone: 505/464-4711
Fax: 505/464-4637

June 10, 2004

Mr. Scott C. Flanders
United States
Nuclear Regulatory Commission
Washington, D.C. 20555-0001

RE: Cultural Resources Inventory Report for Louisiana Energy Services proposed Gas Centrifuge Uranium Enrichment Facility in Lea County, New Mexico

Dear Mr. Flanders:

(X) The *Mescalero Apache Tribe* has determined that the proposed Gas Centrifuge Uranium Enrichment Facility in Lea County, New Mexico **WILL NOT AFFECT** any objects sites, or locations important to our traditional culture or religion.

( ) The *Mescalero Apache Tribe* has determined that the proposed _____ project by _____ **WILL AFFECT** objects, sites, or locations important to our traditional culture or religion. We request that the _____undertake further consultations to evaluate the effects of the project on the sites.

Thank you for providing the Mescalero Apache Tribe the opportunity to comment on this project. We look forward to reviewing and commenting on U.S. Nuclear Regulatory Commission projects.

CONCUR:

for Holly Houghten
Tribal Historic Preservation Officer

COMMENTS:_____

_____

Zeitoun, Abe

-----Original Message-----
From: Massengill, Sandra [mailto:SMASSENGILL@state.nm.us]
Sent: Monday, May 24, 2004 12:47 PM
To: Zeitoun, Abe
Subject: FW: Land & Water Conservation Fund Consultation

FYI
-----Original Message-----
From: Massengill, Sandra
Sent: Monday, May 24, 2004 10:47 AM
To: 'rabousleman'
Subject: RE: Land & Water Conservation Fund Consultation

Thanks so much for the response.

-----Original Message-----
From: rabousleman [mailto:rabousleman@leaco.net]
Sent: Monday, May 24, 2004 7:43 AM
To: Massengill, Sandra
Subject: Re: Land & Water Conservation Fund Consultation

Sandra:

The Eunice parks are not affected by the proposed NEF plant. The plant location is approximately five miles east of Eunice. All parks are located in the City except one which is located about five miles west of the City.

If you need other information, give me a call.

Ron

-----Original Message-----
From: Massengill, Sandra
Sent: Monday, May 03, 2004 11:18 AM
To: 'rabousleman@leaco.net'
Subject: FW: Land & Water Conservation Fund Consultation

Could you please verify that the Eunice Parks funded with LWCF funds is not affected by the proposed NEF facility so I can forward your response to Mr.. Zeitoun? Thanks!

-----Original Message-----
From: Zeitoun, Abe [mailto:AZeitoun@atlinti.com]
Sent: Thursday, April 01, 2004 12:33 PM
To: smassengill@state.nm.us
Subject: FW: Land & Water Consevation Fund Consultation

Dear Ms. Sandra Massengill,

In reference to our telephone conversation yesterday, please find attached the maps for Eunice and the maps that shows the proposed National Enrichment Facility in relation to the city of Eunice. The National Park Service raised concern that the construction and operation of the proposed facility may conflict with Section 6(f)(3) of the L&WCF program that you administer for the State of New Mexico. Projects cited in the National Park Service letter were: 035, 177, 215, 358, 527, 770, 970, 987, 989, and 1096. Please advice.

Thank You

Abe Zeitoun

Corporate Vice President
ATL International, Inc.
20010 Century Blvd., Suite 500
Germantown, MD 20874
(301) 515-6770 Voice
(301) 972-6904 fax

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 27, 2004

Alonso Chalepah, Chairman
Apache Tribe of Oklahoma
PO Box 1220
Anadarko, OK 73005

SUBJECT: CULTURAL RESOURCES INVENTORY REPORT FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Chairman Chalepah:

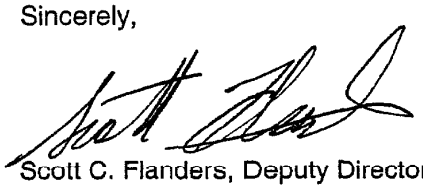
As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

As described in our letter dated February 17, 2004, which requested information for the Section 106 process of the National Historic Preservation Act, LES performed a cultural resource survey of the proposed National Enrichment Facility (NEF) site in September 2003. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. A copy of the cultural resources report documenting the cultural resource inventory is enclosed. Site location information contained in the report may not be released to the general public under federal law, and it is essential that this information be protected.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe have been identified. The NRC staff is interested in knowing if you have specific knowledge of any properties within the APE that you believe have traditional religious and cultural significance. In addition, we are interested in knowing if you are aware of or are concerned for any site, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure appropriate consideration in the Section 106 process.

If you have any questions or comments regarding this request, please contact Matthew Blevins of my staff at (301) 415-7684.

Sincerely,



Scott C. Flanders, Deputy Director
Environmental and Performance Assessment Directorate
Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Inventory for the National Enrichment Facility

cc w/o enclosure: Ms. Jan Biella
Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 27, 2004

Jimmy Arteberry, Director of Environment
Comanche of Oklahoma
PO Box 908
Lawton, OK 73502

SUBJECT: CULTURAL RESOURCES INVENTORY REPORT FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Mr. Arteberry:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

As described in our letter dated February 17, 2004, which requested information for the Section 106 process of the National Historic Preservation Act, LES performed a cultural resource survey of the proposed National Enrichment Facility (NEF) site in September 2003. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. A copy of the cultural resources report documenting the cultural resource inventory is enclosed. Site location information contained in the report may not be released to the general public under federal law, and it is essential that this information be protected.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe have been identified. The NRC staff is interested in knowing if you have specific knowledge of any properties within the APE that you believe have traditional religious and cultural significance. In addition, we are interested in knowing if you are aware of or are concerned for any site, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure appropriate consideration in the Section 106 process.

If you have any questions or comments regarding this request, please contact Matthew Blevins of my staff at (301) 415-7684.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment
Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Inventory
for the National Enrichment Facility

cc w/o enclosure: Ms. Jan Biella
Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 27, 2004

Arturo Sinclair, Governor
Ysleta del Sur Pueblo
P.O. Box 17579 - Ysleta Station
El Paso, TX 79917

SUBJECT: CULTURAL RESOURCES INVENTORY REPORT FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Governor Sinclair:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

As described in our letter dated February 17, 2004, which requested information for the Section 106 process of the National Historic Preservation Act, LES performed a cultural resource survey of the proposed National Enrichment Facility (NEF) site in September 2003. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. A copy of the cultural resources report documenting the cultural resource inventory is enclosed. Site location information contained in the report may not be released to the general public under federal law, and it is essential that this information be protected.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe have been identified. The NRC staff is interested in knowing if you have specific knowledge of any properties within the APE that you believe have traditional religious and cultural significance. In addition, we are interested in knowing if you are aware of or are concerned for any site, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure appropriate consideration in the Section 106 process.

If you have any questions or comments regarding this request, please contact Matthew Blevins of my staff at (301) 415-7684.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment Directorate
Division of Waste Management and Environmental Protection
Office of Nuclear Material Safety and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Inventory for the National Enrichment Facility

cc w/o enclosure: Ms. Jan Biella
Service List

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 27, 2004

Clifford A. McKenzie, Chairman
Kiowa Tribe of Oklahoma
PO Box 369
Carnegie, OK 73015

SUBJECT: CULTURAL RESOURCES INVENTORY REPORT FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Chairman McKenzie:

As you are aware, by letter dated December 12, 2003, Louisiana Energy Services (LES) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for a license to construct, operate, and decommission a gas centrifuge uranium enrichment facility to be located near Eunice, New Mexico.

As described in our letter dated February 17, 2004, which requested information for the Section 106 process of the National Historic Preservation Act, LES performed a cultural resource survey of the proposed National Enrichment Facility (NEF) site in September 2003. Seven prehistoric archeological sites were identified with several of these sites occurring in the Area of Potential Effects (APE). The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. A copy of the cultural resources report documenting the cultural resource inventory is enclosed. Site location information contained in the report may not be released to the general public under federal law, and it is essential that this information be protected.

As you will see in the report, no properties of traditional religious and cultural significance to an Indian tribe have been identified. The NRC staff is interested in knowing if you have specific knowledge of any properties within the APE that you believe have traditional religious and cultural significance. In addition, we are interested in knowing if you are aware of or are concerned for any site, or object eligible for inclusion on the National Register of Historic Places that is not included in the report. This will assure appropriate consideration in the Section 106 process.

If you have any questions or comments regarding this request, please contact Matthew Blevins of my staff at (301) 415-7684.

Sincerely,

Scott C. Flanders, Deputy Director
Environmental and Performance Assessment
Directorate
Division of Waste Management and Environmental
Protection
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Inventory
for the National Enrichment Facility

cc w/o enclosure: Ms. Jan Biella
Service List

STATE OF NEW MEXICO
DEPARTMENT OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

228 EAST PALACE AVENUE
SANTA FE, NEW MEXICO 87501
(505) 827-6320

BILL RICHARDSON
Governor

April 26, 2004

Matthew Blevins
Project Manager
Environmental and Low-Level Waste Section
U.S. Nuclear Regulatory Commission
Mail Stop T7J8
Washington D.C. 20555

Re: National Enrichment Facility Near Eunice, Lea County, New Mexico

Dear Mr. Blevins:

I am writing to follow-up the meeting held between our office, you, Melanie Wong and Paul Nickens, and David Eck from the NM State Land Office in Albuquerque on April 7, 2004. At our meeting we discussed the process for consultation under Section 106 of the National Historic Preservation Act and the archaeological survey report submitted by WCRM for archaeological survey of the National Enrichment Facility near Eunice, New Mexico.

WCRM discovered and recorded seven prehistoric archaeological sites within the project area and recommended that four of the sites (LA 140704, LA 140705, LA 140706, and LA 140707) are eligible for listing to the National Register of Historic Places. WCRM recommended that three sites (LA 140701, LA 140702, and LA 140703) are not eligible for listing to the Register. We do not concur with these recommendations of eligibility. In our opinion, all seven sites are similar site types and may contain buried cultural resources; therefore, archaeological sites LA 140701, LA 140702, and LA 140703 are of undetermined eligibility to be listed to the Register.

It appears from the site location map (Figure 4) of the survey report that three of the archeological sites (LA 140702, LA 140701, and LA 140705) are within the proposed construction footprint for the enrichment facility. Since these sites will be impacted by construction we have determined that the National Enrichment Facility will have an adverse effect on cultural resources.

In order to resolve adverse effects to cultural resources we suggest that our office and the NRC enter into a Memorandum of Agreement (MOA) that outlines agreed-upon measures that NRC will take to mitigate the adverse effects. An example of an MOA is enclosed for your reference.

NRC will need to notify the Advisory Council on Historic Preservation (ACHP) that there will be adverse effects to cultural resources and invite them to be a signatory to the MOA. The ACHP may decline to participate. The NRC must also re-contact Native American tribes, forward copies of the archaeological survey report for their review, and ask if they wish to be concurring parties to the MOA.

It is our understanding that the current land status is the NM State Land Office and that they have entered into a long-term lease agreement with Louisiana Energy Services for the project area, but that the land may be traded after the license from NRC is obtained. This trade will need to be discussed in the MOA and the Commissioner of Public Lands will also be a signatory to the MOA. An exchange from state land to private is considered an adverse effect, thus all seven sites, not just the three within the project area will have to be considered for mitigation.

As we discussed during our meeting, there are several options for mitigating the adverse effects to the archaeological sites. One option is to treat all seven sites as eligible for listing to the Register and considering them as a population of sites. A data recovery plan will be designed to treat all seven sites as a population, meaning that each site will not need full data recovery. This alternative may be the least costly since it eliminates the need for testing to determine eligibility.

A second option would be for Louisiana Energy Services to avoid and protect the sites outside of the project (LA 140703, LA 140704, LA 140706, and LA 140707) by nominating them for listing to the State Register of Cultural Properties. Enclosed are copies of the New Mexico Cultural Properties Act and Cultural Properties Protection Act. In these statutes you will find information concerning the responsibilities of state agencies (in this case the State Land Office) and the State Register of Cultural Properties.

Sincerely,

Michelle M. Ensey
Staff Archaeologist

Log: 70747
Enc. Sample MOA, Cultural Properties Act, Cultural Properties Protection Act
Cc: R.M. Krich, Vice President, licensing, Safety, and Nuclear Engineering, Louisiana Energy Services, One Sun Plaza, 100 Sun Lane NE, Suite 204, Albuquerque, NM 87109
Tim Leftwich, Principal, GL Environmental, Inc., 4200 Meadowlark Lane, Suite 1A. Rio Rancho, NM 87124
David C. Eck, Cultural Resource Specialist, NM State Land Office
Thomas J. Lennon, Principal Investigator, WCRM, 2603 West Main St., Suite B, Farmington, NM 87401

MEMORANDUM OF AGREEMENT

AMONG

THE FEDERAL HIGHWAY ADMINISTRATION,
THE NEW MEXICO STATE HIGHWAY AND TRANSPORTATION DEPARTMENT,
AND
THE NEW MEXICO STATE HISTORIC PRESERVATION OFFICE,

REGARDING

DATA RECOVERY AT LA 740 AND LA 750 ALONG US 84/285, SANTA FE COUNTY, NEW MEXICO

WHEREAS, the Federal Highway Administration (FHWA), in cooperation with the New Mexico State Highway and Transportation Department (NMSHTD) proposes to construct an interchange and associated local access road near Cuyamungue on US 84/285 between Santa Fe and Pojoaque, on highway right of way acquired from private sources, (NMSHTD project AC-HPP-MIP-084-6(59)177, CN 2155); and

WHEREAS, the FHWA, acting as lead agency, has determined that the Project adversely affects LA 740 and LA 750, archaeological sites eligible for inclusion in the National Register of Historic Places under criterion "d", and has consulted with the Advisory Council on Historic Preservation (Council) and the New Mexico State Preservation Officer (SHPO), pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act; and has determined that data recovery is the most appropriate form of treatment to mitigate adverse effects of the Project on this site; and

WHEREAS, the Advisory Council has declined to be a signatory to this Agreement; and

WHEREAS, the Data Recovery Plan, provided in Appendix A, has been developed and prepared in a manner consistent with the *Secretary of the Interior's Standards and Guidelines for Archaeological Documentation* (48 FR 44734-37) and the Council's handbook, *Treatment of Archaeological Properties;*

NOW THEREFORE, the FHWA, NMSHTD, and the SHPO agree that the project shall be administered in accordance with the following stipulations in order to take into account the effect of the Project on historic properties and to satisfy responsibilities under Section 106 for the Project.

STIPULATIONS

I. To the extent of its legal authority and in coordination with the SHPO, the FHWA and the NMSHTD will ensure that the measures and procedures specified in the data recovery plan by the consultant are implemented; this Agreement addresses all aspects of the data recovery plan developed by the consultant.

II. The consultant will prepare a final report discussing the findings resulting from the data recovery efforts. The report will be reviewed by the NMSHTD and the SHPO and any necessary revisions will be completed by the consultant. The NMSHTD will have 30 days for review; following this time period the SHPO will have 30 days to review the report.

III. Data recovery on state lands (highway right of way acquired from private sources) will be done by a cultural resource consultant via a permit issued by the Cultural Properties Review Committee (CPRC).

IV. DISCOVERY SITUATIONS

A. In the event that unrecorded or unanticipated properties that may be eligible for inclusion on the National Register are located during data recovery, or it is recognized that such actions may effect a known historic property in an unanticipated manner, the FHWA/NMSHTD will terminate data recovery in the vicinity of the property and will take all reasonable measures to avoid or minimize harm to the property until consultation with the SHPO regarding significance and effect can be concluded. The FHWA/NMSHTD will notify the SHPO at the earliest possible time and consult to develop actions that will take the effects of the undertaking into account. The FHWA/NMSHTD will notify the SHPO of any time constraints, and the FHWA/NMSHTD and the SHPO will mutually agree upon time frames for the consultation. These procedures will be addressed in the Monitoring and Discovery Plan included as part of the data recovery plan.

V. TREATMENT OF HUMAN REMAINS

B. Since the site is on state lands, the treatment and disposition for any burial or "human remains and associated funerary object, material objects or artifacts" will be in accordance with Section 18-6-11.2 of the State's Cultural Properties Act and 4 NMAC 10.11 regulations, including consultation through HPD and the Office of Indian Affairs with the appropriate Indian tribes. All of these sensitive objects will be treated with dignity and respect and consideration for the specific cultural and religious traditions applicable until their analysis is complete and their disposition has occurred. The limited analysis of human remains and associated funeral objects will be non-destructive unless otherwise agreed to by the culturally affiliated tribe(s).

VI. CURATION

A. The FHWA/NMSHTD shall ensure that the consultant provides for all records and materials resulting from data recovery efforts to be curated in accordance with standards and guidelines generated by 36 CFR Part 79. Artifacts will be curated at the Museum of New Mexico/MIAC.

VII. DISPUTE RESOLUTION

A. Should any Signatory to this Agreement object within 30 calendar days to any action(s) provided for review pursuant to this Agreement, the FHWA/NMSHTD shall consult with the objecting party to resolve the objection. The objection must be specifically identified, and the reasons for objection documented. If the FHWA/NMSHTD determines that the objection cannot be resolved, the FHWA/NMSHTD shall forward all documentation relevant to the dispute to the Council, pursuant to 36 CFR 800.7(b), and notify SHPO as to the nature of the dispute. Within 45 calendar days of receipt of all pertinent documentation, the Council shall provide the FHWA/NMSHTD with recommendations in accordance with 36 CFR 800.7(C)(2)

B. Any Council comment provided in response to such a request will be taken into account by the FHWA/NMSHTD in accordance with 36 CFR 800.7(b)(4) with reference to the subject of the dispute. Any recommendation or comment provided by the Council will be understood to pertain only to the subject of the dispute; the FHWA/NMSHTD and the consultant responsibilities to carry out all actions under this Agreement that are not the subject of the dispute will remain unchanged.

VIII. OBJECTIONS

A. At any time during the implementation of the measures stipulated in this Agreement, should an objection be raised by a consulting party or a member of the public, the FHWA/NMSHTD shall take the objection into account, notify the SHPO of the objection, and consult as needed with the objecting party to resolve the objection. If the FHWA determines that the objection cannot be resolved, the FHWA shall forward all documentation relevant to the dispute to the Council and request that the Council comment.

B. After receipt of the pertinent documentation, the Council shall either:

1. Provide the FHWA with recommendations to take into account in reaching a final decision regarding the dispute; or
2. Notify the FHWA that the Council will comment in accordance with 36 CFR Section 800.6(b)(2) and proceed to comment.

C. Any Council comment provided in response to such a request shall be taken into account by the FHWA in accordance with 36 CFR Section 800.6(c)(2) with reference only to the subject of the dispute. The FHWA responsibility to carry out all other actions and activities under this MOA that are not the subject of the dispute remain unchanged.

IX. DURATION OF AGREEMENT/TERMINATION

A. Should the proposed project be approved by the FHWA/NMSHTD and the SHPO, this MOA shall remain in effect until all construction associated with the interchange has been completed, and when all requirements of the treatment and data recovery plans and stipulations of the MOA have been met. If implementation is delayed for more than two years after the date of execution of this MOA, the FHWA/NMSHTD shall review this MOA to determine whether revisions are needed. If revisions are needed, the FHWA/NMSHTD will consult in accordance with 36 CFR Part 800 to make such revisions.

B. Any signatory to this agreement may terminate it by providing 30 days notice to the other parties, providing that the parties will consult during the period prior to the termination to seek agreements or amendments or other actions that would avoid termination. In the event of termination, the FHWA/NMSHTD will comply with 36 CFR 800.3 through 800.6.

X. AMENDMENT

A) Any Signatory to this Agreement pursuant to 36 CFR 800.6(c)(1) may request that it be amended, whereupon the Signatories will consult in accordance with 36 CFR Part 800.6(c)(7) to consider such amendment.

XI. FAILURE TO CARRY OUT THE TERMS OF THE AGREEMENT

In the event that the terms of this Agreement are not completed, the FHWA/NMSHTD shall comply with 36 CFR 800.3 through 800.6 with regard to individual actions covered by this Agreement.

XII. SCOPE OF AGREEMENT

A. This Agreement is limited in scope to the construction of the Cuyamungue interchange and the associated local access road adjacent to US 84/285, CN 2155, and is entered into solely for that purpose, should the proposed project be approved by the FHWA/NMSHTD.

B. Execution of this MOA, its subsequent filing with the Council, and implementation of its terms, evidences that the FHWA/NMSHTD has afforded the Council an opportunity to comment on the US 84/285 Cuyamungue interchange project (CN 2155) and its effects on historic properties, and has, therefore, taken into account the effects of the project, if it is approved, on historic properties and has satisfied its Section 106 responsibilities for all individual actions of this undertaking.

DATA RECOVERY PLAN FOR PORTIONS OF LA 391 ALONG U.S. 84/285, SANTA FE COUNTY, NEW MEXICO

Federal Highway Administration

By: _____ Date: _____
J. Don Martinez
Division Administrator

New Mexico State Historic Preservation Officer

By: _____ Date: _____
Katherine Slick
State Historic Preservation Officer

New Mexico State Highway and Transportation Department

By: _____ Date: _____
R. Blake Roxlau
Cultural Resources Coordinator

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 29, 2004

Ms. Jan Biella
Deputy SHPO
Historic Preservation Division
Office of Cultural Affairs
228 East Palace Avenue
Santa Fe, NM 87503

SUBJECT: CULTURAL RESOURCE INVENTORY FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

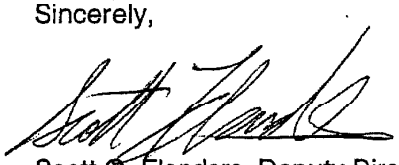
Dear Ms. Biella:

As discussed in our February 17, 2004, letter, Louisiana Energy Services has submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct, operate, and decommission a proposed gas centrifuge uranium enrichment facility at a site in Lea County, New Mexico. The NRC staff is in the initial stages of developing an Environmental Impact Statement for the proposed facility and is in the early stages of soliciting information from potential consulting parties.

Enclosed for your review is a cultural resource survey performed in September 2003 for the proposed site. Seven prehistoric archeological sites were identified, with four of the sites potentially eligible for listing on the National Register of Historical Places. One of these potentially eligible sites is considered within the area of potential effects (APE). The APE is considered the National Enrichment Facility site area, including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. The NRC staff, in consultation with your office and any identified consulting parties, will provide a determination of eligibility after the Cultural Resources Report is reviewed.

If you have any questions or comments, or need any additional information, please contact Matthew Blevins of my staff at 301-415-7684.

Sincerely,



Scott C. Flanders, Deputy Director
Environmental and Performance Assessment Directorate
Division of Waste Management
and Environmental Protection
Office of Nuclear Material Safety
and Safeguards

Enclosure: Cultural Resources Inventory for the National Enrichment Facility

Docket No.: 70-3103

cc: Alonso Chalepah, Chairman (w/o enclosure)
Clifford McKenizie, Chairman (w/o enclosure)
Arturo Sinclair, Governor (w/o enclosure)
Jimmy Arterberry, Director of Environment (w/o enclosure)
Holly B. E. Houghten, Tribal Historic Preservation Officer (w/o enclosure)
Service List w/o enclosure (w/o enclosure)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

March 26, 2004

Cons. # 2-22-04-I-349

Lawrence E. Kokajko, Chief
Environmental and Performance Assessment Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Kokajko:

Thank you for your March 2, 2004, letter requesting information on threatened or endangered species or important wildlife habitats that could be affected by a proposed project to construct, operate, and decommission a gas centrifuge uranium enrichment facility near Eunice, Lea County, New Mexico. The proposed facility and construction would disturb 543 acres of land located within the Louisiana Energy Services National Enrichment Facility site.

We have enclosed a current list of federally endangered, threatened, proposed, and candidate species, and species of concern that may be found in Lea County, New Mexico.[1] Under the Endangered Species Act, as amended (Act), it is the responsibility of the Federal action agency or its designated representative to determine if a proposed action "may affect" endangered, threatened, or proposed species, or designated critical habitat, and if so, to consult with us further. If your action area has suitable habitat for any of these species, we recommend that species-specific surveys be conducted during the flowering season for plants and at the appropriate time for wildlife to evaluate any possible project-related impacts. Please keep in mind that the scope of federally listed species compliance also includes any interrelated or interdependent project activities (e.g., equipment staging areas, offsite borrow material areas, or utility relocations) and any indirect or cumulative effects.

Candidates and species of concern have no legal protection under the Act and are included in this document for planning purposes only. We monitor the status of these species. If significant declines are detected, these species could potentially be listed as endangered or threatened. Therefore, actions that may contribute to their decline should be avoided. We recommend that candidates and species of concern be included in your surveys.

---

[1] Additional information about these species is available on the Internet at <http://nmrareplants.unm.edu>, <http://nmnhp.unm.edu/bisonnm/bisonquery.php>, and <http://ifw2es.fws.gov/endangeredspecies>.

Under Executive Orders 11988 and 11990, Federal agencies are required to minimize the destruction, loss, or degradation of wetlands and floodplains, and preserve and enhance their natural and beneficial values. We recommend you contact the U.S. Army Corps of Engineers for permitting requirements under section 404 of the Clean Water Act if your proposed action could impact floodplains or wetlands. These habitats should be conserved through avoidance, or mitigated to ensure no net loss of wetlands function and value.

The Migratory Bird Treaty Act (MBTA) prohibits the taking of migratory birds, nests, and eggs, except as permitted by the U.S. Fish and Wildlife Service (Service). To minimize the likelihood of adverse impacts to all birds protected under the MBTA, we recommend construction activities occur outside the general migratory bird nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until nesting is complete.

The primary concern of the Service is the protection of the Nation's fish and wildlife resources including threatened and endangered species, migratory birds, and their habitats. Under its responsibilities in the Migratory Bird Treaty Act, the Service would be concerned if an open, hazardous waste impoundment attracted migratory birds or other wildlife to their detriment. During flight, migratory birds (as well as bats) would not necessarily distinguish between an impoundment and a natural waterbody and could be attracted to drink, rest, and perhaps feed on the insects that are invariably associated with impounded wastewater. The facility lighting could attract them as well. Therefore, the Service supports that any open hazardous waste lagoon, pond, or container be constructed with appropriate exclusion technology (*e.g.*, netting, fences, enclosed tanks, *etc.*) to prevent migratory bird access, and that any exclusion technologies are regularly maintained. To minimize the likelihood of adverse impacts to nesting migratory birds during facility construction, we recommend that construction activities occur outside the general migratory bird-nesting season of March through August, or that areas proposed for construction during the nesting season be surveyed, and when occupied, avoided until nesting is complete.

We suggest you contact the New Mexico Department of Game and Fish, and the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division for information regarding fish, wildlife, and plants of State concern.

Thank you for your concern for endangered and threatened species and New Mexico's wildlife habitats. In future correspondence regarding this project, please refer to consultation # 2-22-04-I-349. If you have any questions about the information in this letter, please contact Dennis Coleman at the letterhead address or at (505) 346-2525, ext. 4716.

Sincerely,

Susan MacMullin

Susan MacMullin
Field Supervisor

Enclosure

cc: (w/o enc)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, Santa Fe, New Mexico

Revised: September 2003

FEDERAL ENDANGERED, THREATENED,
PROPOSED, AND CANDIDATE SPECIES
AND SPECIES OF CONCERN IN NEW MEXICO
Consultation Number 2-22-04-I-349
March 25, 2004

Lea County

ENDANGERED

Black-footed ferret (*Mustela nigripes*)**
Northern aplomado falcon (*Falco femoralis septentrionalis*)

THREATENED

Bald eagle (*Haliaeetus leucocephalus*)

CANDIDATE

Black-tailed prairie dog (*Cynomys ludovicianus*)
Lesser prairie chicken (*Tympanuchus pallidicinctus*)
Sand dune lizard (*Sceloporus arenicolus*)

SPECIES OF CONCERN

Swift fox (*Vulpes velox*)
American peregrine falcon (*Falco peregrinus anatum*)
Arctic peregrine falcon (*Falco peregrinus tundrius*)
Baird's sparrow (*Ammodramus bairdii*)
Bell's vireo (*Vireo bellii*)
Western burrowing owl (*Athene cunicularia hypugea*)
Yellow-billed cuckoo (*Coccyzus americanus*)

Index

Endangered	=	Any species which is in danger of extinction throughout all or a significant portion of its range.
Threatened	=	Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
Candidate	=	Candidate Species (taxa for which the Service has sufficient information to propose that they be added to list of endangered and threatened species, but the listing action has been precluded by other higher priority listing activities).
Proposed	=	Any species of fish, wildlife or plant that is proposed in the Federal Register to be listed under section 4 of the Act.
Species of Concern	=	Taxa for which further biological research and field study are needed to resolve their conservation status OR are considered sensitive, rare, or declining on lists maintained by Natural Heritage Programs, State wildlife agencies, other Federal agencies, or professional/academic scientific societies. Species of Concern are included for planning purposes only.
**	=	Survey should be conducted if project involves impacts to prairie dog towns or complexes of 200-acres or more for the Gunnison's prairie dog (*Cynomys gunnisoni*) and/or 80-acres or more for any subspecies of Black-tailed prairie dog (*Cynomys ludovicianus*). A complex consists of two or more neighboring prairie dog towns within 4.3 miles (7 kilometers) of each other.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 18, 2004

Mr. Lewis Robertson
Lea County Archaeological Society
1980 NE 1001
Andrews, TX 79714-9154

SUBJECT: INITIATION OF THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Mr. Robertson:

The U.S. Nuclear Regulatory Commission (NRC) has recently received an application from Louisiana Energy Services (LES) to construct, operate, and decommission the National Enrichment Facility (NEF), a gas centrifuge uranium enrichment facility. The proposed NEF would be located near Eunice, New Mexico, in Lea County and would be within a 543 acre parcel of land that LES is in the process of acquiring from the State of New Mexico. The NRC is in the initial stages of developing an Environmental Impact Statement (EIS) which will document the impacts associated with the NEF. We would like your assistance in our review of the cultural resources impacts.

In September 2003, LES performed a survey of the proposed NEF site. Seven prehistoric archeological sites were identified with several of these sites occurring in the area of potential effects (APE). One site that may be affected is potentially eligible for listing on the National Register of Historical Places. The APE is considered the NEF site area including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. Attached is information LES provided in its Environmental Report relative to cultural resources. We are currently reviewing this information. LES has indicated that it intends to submit the complete Cultural Resources Survey Report of all survey findings.

The NRC staff is soliciting information from a number of stakeholders as the NRC begins its Section 106 consultation with the New Mexico State Historical Preservation Office, as required by the National Historic Preservation Act. We request that you provide any information that you may have relative to this proposed action or the Section 106 consultation. Please contact Matthew Blevins of my staff at (301) 415-7684 if you have any questions.

Sincerely,

Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

Attachment: Cultural Resources Information for LES National Enrichment Facility, Environmental Report, December 12, 2003 (ML040500429)

cc: Ms. Jan Biella (without Enclosure)
Deputy SHPO
Historic Preservation Division
Office of Cultural Affairs
228 East Palace Avenue
Santa Fe, NM 87503

Service List (without Enclosure)

United States Department of the Interior

Bureau of Land Management
Carlsbad Field Office
620 E. Greene Street
Carlsbad, NM 88220
www.nm.blm.gov

IN REPLY REFER TO:
1790

MAR 16 2004

Ms. Melanie Wong
Chief, Rules and Directives Branch
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Ms Wong:

The ~~U.S. Bureau of Land Management~~ (BLM), Carlsbad Field Office appreciates the opportunity to provide technical assistance and participate in the scoping process for the proposed Gas Centrifuge Uranium Enrichment Facility as published in the Federal Register (Vol. 69, No. 23 – Wednesday, February 4, 2004). The BLM understands that the following locations are being considered by Louisiana Energy Services for location of the proposed facility:

1) Section 32, T21S, R38E – preferred by LES;
2) Section 24, T21S, R27E; and
3) Section 8, T22S, R31E.

Following are issues regarding the preferred location and identified alternative locations:

1) While the BLM does not manage any of the resources in section 32 the BLM does manage much of the subsurface minerals in adjacent sections and would be interested in how the proposed facility would affect management of those minerals.
2) The BLM manages both the surface and subsurface resources in the W½, SW¼, Section 24 and therefore would have a strong interest in proposed facilities or management actions affecting that parcel of land as well as nearby federal land and mineral resources.
3) The BLM manages both the surface and subsurface resources in Section 8 and therefore would have a strong interest in proposed facilities or management actions affecting that parcel of land and adjacent federal land and mineral resources.

If the locations identified as alternatives (see #s 2 & 3 above) are carried forward through the National Environmental Policy Act (NEPA) analysis, the BLM is requesting formal cooperating agency status, according to the Council on Environmental Quality (CEQ) regulations for implementing NEPA. Please contact our office to establish the appropriate agreement documentation. However, if only the preferred alternative is analyzed, then the BLM role will be as an interested party and requests that the agency and Carlsbad Office, specifically, be kept informed through the process and provided NEPA documents to review as they are produced.

Please keep the Carlsbad Field Office (CFO) of the Bureau of Land Management (BLM) involved in the evaluation of this proposed action. The CFO-BLM contact for this project will be Peg Sorensen at 505-234-5983 or peg_sorensen@blm.gov. Again, thank you for the opportunity to provide comments.

Sincerely,

Maria E. Keton

Leslie Theiss
Carlsbad Field Manager

United States Department of the Interior
NATIONAL PARK SERVICE
INTERMOUNTAIN REGION
Intermountain Support Office
12795 West Alameda Parkway
PO Box 25287
Denver, Colorado 80225-0287

March 9, 2004

U.S. Nuclear Regulatory Commission
Washington DC, 20555-0001
Rules and Directives Branch
Mail Stop T6-D59, Attn: Chief

Subject: Comments on the Notice of Intent to Prepare an Environmental Impact Statement for Louisiana Energy Services Gas Centrifuge Uranium Enrichment Facility

To Whom It May Concern:

The National Park Service has reviewed the subject Notice of Intent based on the assumption that the project is near the city of Eunice in Lea County, New Mexico. We have reviewed this project in relation to any possible conflicts with the Land and Water Conservation Fund (L&WCF) and the Urban Park and Recreation Recovery programs, and find that the following L&WCF projects may be adversely affected:

35-00035, Eunice Municipal Park
35-00177, Eunice Municipal Recreation Park
35-00215, Eunice Municipal Golf Course
35-00358, Eunice Neighborhood Park
35-00527, Eunice Tennis Court Renovation
35-00770, Marshall Memorial Park
35-00970, Marshall Park Sprinklers
35-00987, Marshall Park Improvements
35-00989, Stevens Park Improvements
35-01096, Marshall Park Trail

We recommend you consult directly with the official who administers the L&WCF program in the State of New Mexico to determine any potential conflicts with Section 6(f)(3) of the L&WCF Act (Public Law 88-578, as amended). This section states: "No property acquired or developed with assistance under this section shall, without the approval of the Secretary [of the Interior], be converted to other than public outdoor recreation uses.' The Secretary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreation plan and only upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location."

The administrator for the L&WCF program in New Mexico is Ms. Sandra Massengill, Planner Director, Department Energy, Minerals & Natural Resources, 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505-4000. Ms. Massengill's phone number is: (505) 476-3392.

Thank you again for the opportunity to comment on this project. If you have any questions, please contact Jane Beu, Outdoor Recreation Planner, in our Midwest Regional Office at (402) 221-7270.

Sincerely,

Cheryl Eckhardt
NEPA/106 Specialist

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 2, 2004

Ms. Joy Nicholopoulos
U.S. Fish and Wildlife Service
New Mexico Field Office
2105 Osuna Road NE
Albuquerque, NM 87113-1001

SUBJECT: REQUEST FOR INFORMATION REGARDING ENDANGERED SPECIES AND CRITICAL HABITATS FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NM

Dear Ms. Nicholopoulos:

Louisiana Energy Services (LES) has submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct, operate, and decommission a proposed gas centrifuge uranium enrichment facility. The NRC is in the initial stages of developing an Environmental Impact Statement (EIS) for the proposed facility to be located near Eunice, New Mexico, in Lea County. The proposed facility, as well as all associated construction, operation, and decommissioning activities and impacts, will be within the 220-ha (543 acre) LES National Enrichment Facility (NEF) site.

We are requesting a list of threatened or endangered species or critical habitats within the action area. The action area is defined as the NEF site which is located in Section 32 of Township 21 South, Range 38 East (New Mexico Meridian). The approximate center is at Latitude 32 degrees, 26 minutes, 1.74 seconds North and Longitude 103 degrees, 4 minutes, 43.47 seconds West. The action area is approximately 5 miles East of Eunice, New Mexico and is bordered on the South by New Mexico Highway 234.

After assessing the information provided by you, the NRC will determine what additional actions are necessary to comply with Section 7 of the Endangered Species Act. If you have any questions or comments, or need any additional information, please contact Matthew Blevins of my staff at 301-415-7684.

Sincerely,

Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

After assessing the information provided by you, the NRC will determine what additional actions are necessary to comply with Section 7 of the Endangered Species Act. If you have any questions or comments, or need any additional information, please contact Matthew Blevins of my staff at 301-415-7684.

Sincerely,

/RA/

Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

GOVERNOR
Bill Richardson

STATE OF NEW MEXICO
DEPARTMENT OF GAME & FISH

One Wildlife Way
PO Box 25112
Santa Fe, NM 87504

Visit our website at www.wildlife.state.nm.us
For basic information or to order free publications: 1-800-862-9310.

DIRECTOR AND SECRETARY
TO THE COMMISSION
Bruce C. Thompson

STATE GAME COMMISSION
Guy Riordan, Chairman
Albuquerque, NM

Alfredo Montoya, Vice-Chairman
Alcalde, NM

David Henderson
Santa Fe, NM

Jennifer Atchley Montoya
Las Cruces, NM

Peter Pino
Zia Pueblo, NM

Dr. Tom Arvas
Albuquerque, NM

Leo Sims
Hobbs, NM

February 23, 2004

Chief, Rules and Directives Branch
Mail Stop T6-D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Docket No. 70-3103
NMGF Project No. 9200

Dear Nuclear Regulatory Commission:

The New Mexico Department of Game and Fish (Department) has received the Notice of Intent to prepare an Environmental Impact Statement (EIS) for the proposed Louisiana Energy Services (LES) gas centrifuge uranium enrichment facility, known as the National Enrichment Facility (NEF). We have reviewed the Environmental Report (ER) submitted by LES with their license application, as it pertains to wildlife resources, and offer our comments below. We also enclose for your information a copy of our September 30, 2003, scoping letter to LES contractor Framatome ANP.

The Department is concerned about the adequacy of the assessment in the ER of potential impacts to the NM State Threatened sand dune lizard (*Scleroporus arenicolus*). Section 3.5.3 states that although "(t)he NEF site contains areas of sand dunes", "(a) survey of the NEF site did not identify any sand dune lizard habitats". Section 3.5.5 characterizes the site vegetation as dense shrubs, mostly shinnery oak (*Quercus havardi*), yet Section 3.5.6 concludes the habitat is unsuitable due to "low frequency of shinnery oak dunes and large blowouts". Section 3.5.8 asserts that "the site does contain sand dune – oak shinnery communities, that could be potential sand dune lizard habitat". Finally Section 4.5.7 refers to the site having "the potential to provide habitat for the sand dune lizard" but "various factors make it unsuitable". This accumulation of seemingly contradictory statements leaves it unclear whether there is in fact suitable habitat for the species or not.

The ER also refers to a survey for sand dune lizards that took place in October 2003 and did not find any. No information is given as to the participants or methods of the survey. If there is in fact suitable habitat, the Department requests information as to the qualifications of the individual(s) conducting the survey. Sand dune lizards are extremely difficult to identify and there are only a very few people qualified to conduct a presence/absence survey. October is rather late in the year for a survey; the lizards are likely to be dormant at that time.

The Department is likewise concerned about the adequacy of assessment in the ER of potential impacts on the lesser prairie chicken (*Tympanuchus pallidicintus*), a federal Species of Concern. The document identifies the site as suitable habitat, states that the nearest known lek (breeding area) is 4 miles distant, and refers to a survey conducted in September 2003, that did not find any lesser prairie chickens. According to our prairie chicken biologist, the area around the project has not been adequately surveyed for lek sites. Surveys should be conducted in the spring (typically early to mid April, before sunrise). Lesser prairie chickens will use an area within two miles of the lek for nesting and rearing. Birds have been reported from the Eunice area. Since there is a large acreage of contiguous habitat, and a lek within four miles, it is reasonable to assume these birds may be impacted by the development.

The National Environmental Policy Act (NEPA) analysis should include assessment of cumulative regional impacts on both of these sensitive species. Other impacts include grazing and oil and gas development.

Although not directly a wildlife habitat issue, the Department would like to express our concern regarding the lack of a final disposal alternative for the depleted uranium tails. The ER presents several plausible options, however each of them faces significant problems and would require many years of feasibility analysis and development. The safeguards and procedures for short- to medium-term storage of the materials seem adequate to prevent health or environmental hazards, however the lack of a viable solution for disposal may lead to environmental exposure of radioactive materials in the long term.

LES proposes a number of favorable mitigations, including the use of native plant species for revegetation, downshielding site illumination to reduce impact on bird behavior, various habitat improvements and following the Department's recommendations regarding pipeline trenching and exclusion of migratory birds from the evaporative ponds. These mitigations should be incorporated into the license approval, if granted. The Department remains available for further consultation on development of possible mitigations.

Thank you for the opportunity to participate in the preparation of NEPA analysis and documentation for this project. If you have any questions, please contact Rachel Jankowitz at 505-476-8159 or rjankowitz@state.nm.us.

Sincerely,

Lisa Kirkpatrick

Lisa Kirkpatrick, Chief
Conservation Services Division

LK/rjj

cc: Joy Nicholopoulos, Ecological Services Field Supervisor, USFWS
Roy Hayes, SE Area Operations Chief, NMGF
Alexa Sandoval, SE Area Habitat Specialist, NMGF
Rachel Jankowitz, Habitat Specialist, NMGF

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 17, 2004

Ms. Jan Biella
Deputy SHPO
Historic Preservation Division
Office of Cultural Affairs
228 East Palace Avenue
Santa Fe, NM 87503

SUBJECT: INITIATION OF THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 PROCESS FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY

Dear Ms. Biella:

Louisiana Energy Services (LES) has submitted a license application to the U.S. Nuclear Regulatory Commission (NRC) to construct, operate, and decommission a proposed gas centrifuge uranium enrichment facility. The NRC is in the initial stages of developing an Environmental Impact Statement (EIS) for the proposed facility to be located near Eunice, New Mexico, in Lea County. The proposed facility will use gas centrifuge technology to enrich the isotope Uranium-235 in uranium hexafluoride (UF_6), up to 5 percent (assay level for practical use in nuclear reactors). This proposed facility, as well as all associated construction, operation, and decommissioning activities and impacts, will be within the 220-ha (543 acre) LES National Enrichment Facility (NEF) site. The forthcoming EIS will document the impacts associated with the construction, operation, and decommissioning of the facility.

In September 2003, LES performed a survey of the proposed NEF site. Seven prehistoric archeological sites were identified, with three of the sites found in the area of potential effects (APE) and one of these sites is potentially eligible for listing on the National Register of Historical Places. The APE is considered the NEF site area, including permanent and temporary building(s) footprints, parking and lay-down areas, and all site access roads. LES has indicated that the one site potentially eligible may be affected by an access road. LES has indicated that it intends to submit the complete Cultural Resources Survey Report of all survey findings. The NRC, in consultation with your office and any identified consulting parties, will provide a determination of eligibility after the Cultural Resources Report is received.

As part of the NRC licensing process, LES submitted an Environmental Report (ER) in support of the proposed NEF. In the ER, LES indicated it had contacted six Indian tribes at your request. As required by 36 CFR 800.4(a), the NRC is requesting the views of the State Historical Preservation Officer on further actions to identify historic properties that may be affected by the NRC's undertaking. As part of the EIS preparation the NRC will be hosting a public scoping meeting Thursday, March 4, 2004, at the Eunice Community Center, 1115 Avenue I, in Eunice, New Mexico from 7:00 p.m. until 10:00 p.m. The meeting will include NRC staff presentations on the safety and environmental review process, after which members of the public will be given the opportunity to present their comments on what environmental issues NRC should consider during its environmental review.

February 17, 2004

This scoping information, along with the forthcoming LES Cultural Resource Report, and any information you provide, will be used to document affects in accordance with 36 CFR Part 800.4 and 800.5. Additionally, we intend to use the EIS process for Section 106 purposes as described in 36 CFR Part 800.8.

We have attached additional background information relating to cultural resources as it appears in the LES ER. If you have any questions or comments, or need any additional information, please contact Matthew Blevins of my staff at 301-415-7684

Sincerely,
/RA/
Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

Enclosure: Cultural Resources Information for LES National Enrichment Facility, Environmental Report, December 12, 2003

Service list

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 17, 2004

Arturo Sinclair, Governor
Ysleta del Sur Pueblo
P.O. Box 17579 - Ysleta Station
El Paso, TX 79917

SUBJECT: INITIATION OF THE NATIONAL HISTORIC PRESERVATION ACT SECTION 106 CONSULTATION FOR LOUISIANA ENERGY SERVICES PROPOSED GAS CENTRIFUGE URANIUM ENRICHMENT FACILITY IN LEA COUNTY, NEW MEXICO

Dear Governor Sinclair:

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If you are unable to attend this meeting, we would still like to hear from you. You are invited to contact Matthew Blevins of my staff at (301) 415-7684 so we may hear your comments or concerns.

Sincerely,

Lawrence E. Kokajko, Chief
Environmental and Performance
Assessment Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Docket No.: 70-3103

Attachment: Cultural Resources Information for LES National Enrichment Facility, Environmental Report, December 12, 2003

cc: Ms. Jan Biella
Deputy SHPO
Historic Preservation Division
Office of Cultural Affairs
228 East Palace Avenue
Santa Fe, NM 87503

Identical Letter sent to:

Alonso Chalepah, Chairman
Apache Tribe of Oklahoma
PO Box 1220
Anadarko, OK 73005

Clifford A. McKenzie, Chairman
Kiowa Tribe of Oklahoma
PO Box 369
Carnegie, OK 73015

Jimmy Arterberry, Director of Environment
Comanche of Oklahoma
PO Box 908
Lawton, OK 73502

Ms. Holly B. E. Houghten
Tribal Historic Preservation Officer
Mescalero Apache Tribe
P.O. Box 227
Mescalero, New Mexico 88340

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APPENDIX C - DOSE METHODOLOGY AND IMPACTS

C.1 Introduction

This appendix presents the methodology, assumptions, data, and results for the potential impacts on individual workers and members of the public resulting from routine or normal operations and accidents from the Louisiana Energy Services (LES) proposed National Enrichment Facility (NEF), including a description of how radioactive material, such as uranium, results in radiation doses and a comparison of these doses to applicable standards.

The consequence of internal and external radiation exposure due to the deposition of energy from radioactive material in body tissues is represented as absorbed dose. Absorbed dose is quantified as energy absorbed per unit of tissue mass. The biological effect on individual tissues is estimated by multiplying the absorbed dose by a factor that accounts for the relative biological effect of differing types of radiation. This modified tissue dose is called dose equivalent. Dose equivalent can represent external radiation (i.e., radiation absorbed through the skin from a source external to the body) or internal radiation (i.e., radiation absorbed by internal tissues of the body due to inhalation or ingestion). The effect on the whole body from external and/or internal radiation is represented as a risk-weighted sum of the set of tissue dose equivalents. This dose, called the effective dose equivalent (EDE), can be integrated over a period of years to account for the accumulated effect from a single year's exposure. The time-integrated measure of effect for internal radiation is called the committed effective dose equivalent (CEDE). CEDEs are combined with dose estimates for external exposure to calculate a measure of effect for both exposure modes, called the total effective dose equivalent (TEDE) (ANL, 2004).

C.1.1 Regulatory Limits

Title 10, "Energy," of the *U.S. Code of Federal Regulations* (10 CFR) Part 20 provides the regulatory limits for occupational doses and radiation dose for individual members of the public. For occupational doses, 10 CFR § 20.1201 states that licensees must limit the occupational dose to individual adults to an annual limit, which is the more limiting of:

- The TEDE being equal to 0.05 sievert (5 rems).
- The sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue other than the lens of the eye being equal to 0.5 sievert (50 rems).

Additionally, the annual limits to the lens of the eye, to the skin of the whole body, and to the skin of the extremities are:

- A lens dose equivalent of 0.15 sievert (15 rems).
- A shallow-dose equivalent of 0.5 sievert (50 rem) to the skin of the whole body or to the skin of any extremity.

In addition to the annual occupational dose limits, 10 CFR § 20.1201 would limit the soluble uranium intake by an individual to 10 milligrams in a week because of chemical toxicity.

An explicit TEDE limit of 1.0 millisievert per year (100 millirem per year) from all sources is provided for individual members of the public. This limit includes both internal and external doses through all

pathways (including food). External dose rates cannot exceed 0.02 millisievert (2 millirem) in any one hour. Further, LES would be subject to the generally applicable standards in 10 CFR § 20.1101 and 40 CFR Part 190. 40 CFR Part 190 requires that routine releases from uranium fuel-cycle facilities to the general environment would not result in annual doses exceeding 0.25 millisievert (25 millirem) to the whole body, 0.75 millisievert (75millirem) to the thyroid, and 0.25 millisievert (25 millirem) to any other organ.

C.2 Pathway Assessment

Exposure to uranium processed by the proposed NEF could occur from routine operations as a result of small controlled releases to the atmosphere from the uranium enrichment process lines and decontamination and maintenance of equipment, releases of radioactive liquids to surface water, and direct radiation from the uranium material. Radioactive material released to the atmosphere, surface water, and ground water is dispersed during transport through the environment and transferred to human receptors through inhalation, ingestion, and direct exposure pathways. Therefore, evaluation of impacts requires consideration of potential receptors, source terms, environmental transport, exposure pathways, and conversion of estimates of intake to dose.

Under the proposed action, the major source of occupational exposure would be expected to be from direct radiation from the uranium hexafluoride (UF_6) with the largest exposure source being the cylinders (empty and full) that hold the UF_6. These cylinders are as follows:

- Type 48Y cylinders containing either the feed material (natural UF_6) or the depleted uranium hexafluoride (DUF_6) called uranium byproduct cylinders (UBCs), or empty with residual material.

- Type 48X cylinders containing the feed material or empty with residual material.

- Type 30 product cylinders holding the enriched UF_6 for shipping to nuclear fuel manufacturers.

In addition to direct radiation, there could be the potential for serious internal exposure from long-term contact with UF_6 leaking from the process equipment and acute exposure resulting from accidents.

The major source of exposure to the general public would be expected to come from atmospheric releases. Such releases would be primarily controlled through the Technical Services Building and Separations Building gaseous effluent vent systems. The principal function of the gaseous effluent vent system is to protect both the operator during the connection/disconnection of UF_6 process equipment and the surrounding population and environment by collecting and cleaning all potentially hazardous gases from the plant prior to release to the atmosphere. In addition, the Centrifuge Test and Postmortem Facilities would have an exhaust filtration system that would serve the same purpose as the gaseous effluent vent system. The Technical Services Building heating, ventilation, and air-conditioning system would perform a confinement ventilation function for potentially contaminated areas in the building. Members of the public, if close enough, could be affected by direct radiation and skyshine (radiation reflected from the atmosphere).

The principal source for direct radiation offsite would be from the storage of UBCs filled with DUF_6 that could be stored within the site boundaries of the proposed NEF. Direct radiation and skyshine from the UF_6 within the Separations Building (i.e., the gaseous centrifuge cascades) would be undetectable because most of the direct radiation associated with this uranium would be almost completely absorbed

by the heavy process lines, walls, equipment, and tanks that would be employed in the gaseous centrifuge cascades.

C.2.1 Receptors of Concern

LES determined distances to the site boundary using guidance from the U.S. Nuclear Regulatory Commission (NRC) Regulatory Guide 1.145 (NRC, 1983). The distance to the nearest resident was determined using global positioning system measurements. Figure C-1 shows the locations of the release points and locations of receptors of concern. The nearest resident is located 4,233 meters (2.6 mi) west of the proposed NEF gaseous effluent vent system stacks at a permanent residence. There are four industrial sites near the proposed NEF that are also considered for their potential exposures from gaseous releases, namely Wallach Concrete, Inc., Sundance Services, Inc., the Lea County landfill, and Waste Control Specialists (WCS). The nearest resident is assumed to be present the entire year (8,766 hours), and workers are assumed to be present for an 8-hour workday, 5 days a week for 50 weeks a year (2,000 hours per year). Table C-1 presents the receptors and estimated distances.

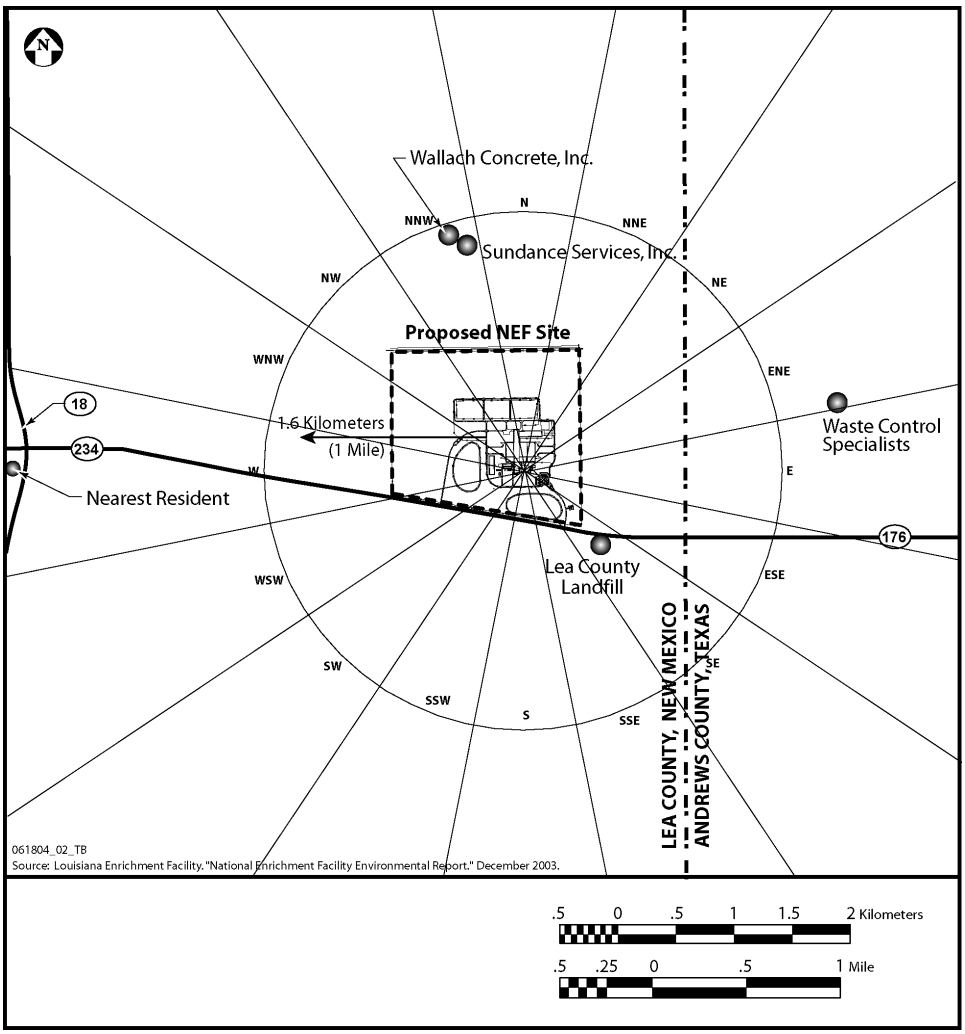

Figure C-1 Locations of Release Points and Individual Receptors (LES, 2004a)

Table C-1 Estimated Distances for Receptors of Concern

Receptor	Direction from Proposed NEF	Estimated Distance from Airborne Effluent Releases meters (miles)	Estimated Distance from UBC Storage Pad Edge to Receptor meters (miles)
Nearest Resident	West	4,233 (2.6)	—
Wallach Concrete, Inc.	North-Northwest	1,867 (1.2)	1,033 (0.6)
Sundance Specialists, Inc.	North-Northwest	1,706 (1.1)	885 (0.6)
Waste Control Specialists	East-Northeast	1,513 (0.9)	783 (0.5)
Lea County Landfill	Southeast	917 (0.6)	—

— No values given since receptor too distant or not in direct path.
Source: LES, 2004a.

The radiological assessment in this Draft Environmental Impact Statement (Draft EIS) determines impacts to a population within 80 kilometers (50 miles) and to a maximum exposed individual whose exposure would bound all foreseeable impacts related to the proposed NEF site operation. The total population within 80 kilometers (50 miles) is 94,758 people as calculated by SECPOP2000, a sector population, land fraction, and economic estimation program prepared for NRC based on Census 2000 data (Bixler, 2003). Figure C-2 presents the population distribution, and Table C-2 presents population data for each of 16 downwind sectors at 10 distance intervals.

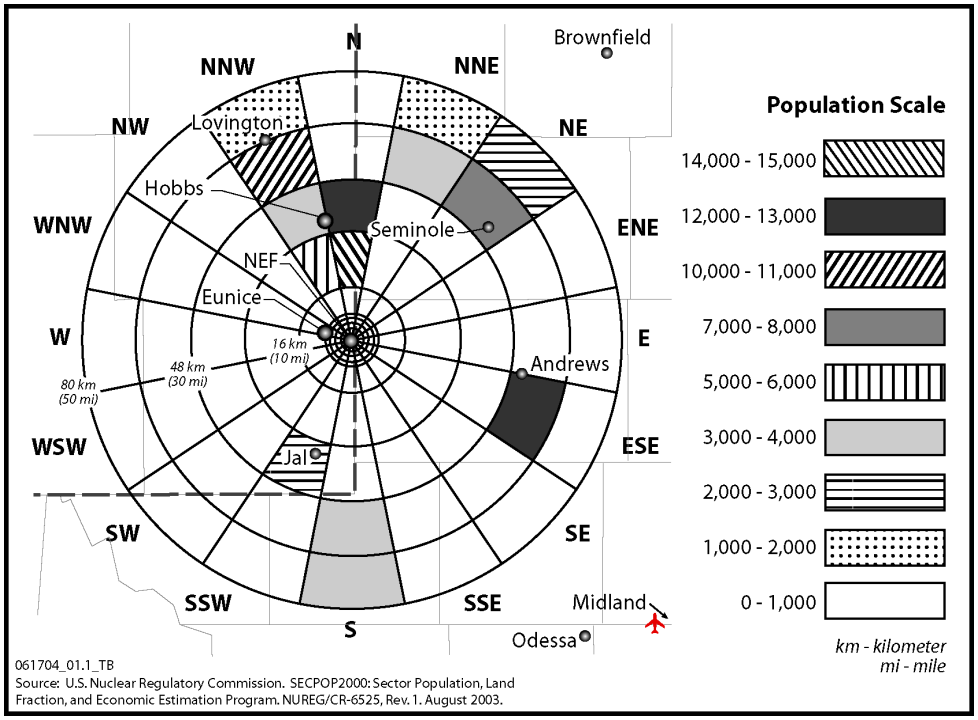

Figure C-2 Population Within 80 Kilometers (50 Miles) of the Proposed NEF (NRC, 2003b)

Table C-2 Public Population in Sectors Surrounding the Proposed NEF

Sector	0-1 mi (0-1.6 km)	1-2 mi (1.6-3.2 km)	2-3 mi (3.2-4.8 km)	3-4 mi (4.8-6.4 km)	4-5 mi (6.4-8.1 km)	5-10 mi (8.1-16.1 km)	10-20 mi (16.1-32.2 km)	20-30 mi (32.2-48.3 km)	30-40 mi (48.3-64.4 km)	40-50 mi (64.4-80.5 km)
N	0	0	0	0	0	9	14,637	12,616	273	222
NNE	0	0	0	0	0	0	69	217	4,760	1,120
NE	0	0	0	0	0	0	49	995	7,464	2,809
ENE	0	0	0	0	0	0	7	430	972	46
E	0	0	0	0	0	0	7	45	351	41
ESE	0	0	0	0	0	0	0	105	12,351	60
SE	0	0	0	0	0	0	23	18	20	848
SSE	0	0	0	0	0	0	0	19	8	18
S	0	0	0	0	0	0	4	37	3,369	3,754
SSW	0	0	0	4	0	6	4	2,033	11	12
SW	0	0	0	0	0	17	12	3	1	3
WSW	0	0	0	0	15	34	9	13	2	8
W	0	0	11	53	2,099	484	13	2	4	21
WNW	0	0	0	0	104	35	20	0	9	8
NW	0	0	0	5	2	3	223	33	43	83
NNW	0	0	0	0	0	0	5,044	4,543	10,565	1,391

mi - mile.

km - kilometer.

C.2.2 Exposure Pathways Parameters

Guidance on acceptable exposure models for the pathways of concern has been published in NRC Regulatory Guide 1.109 (NRC, 1977a) and incorporated into a variety of computer codes. GENII v. 1.485 (Napier et al., 1988) is used to estimate collective radiation doses (person-rem) to members of the public resulting from post-accident inhalation and ingestion of soluble uranium compounds. The exposure pathways analyzed include inhalation of soluble uranium carried by wind, external radiation from radioactivity deposited on the ground downwind of the proposed NEF, and ingestion of contaminated food (produce, meat, and dairy products). The ingestion parameters used to estimate radiological doses to the public are described in Table C-3. For releases of uranium compounds, the northern sectors would have the highest collective doses because Hobbs, New Mexico, is a large population center in the prevailing downwind direction.

Table C-3 Ingestion Parameters Used in GENII to Calculate Collective Radiological Dose to the Public

Parameter Values for Consumption of Terrestrial Food

Food Type	General Population			
	Growing Time (days)	Yield kg/m^2 (lbs/ft^2)	Holdup Time (days)	Consumption Rate kg/yr (lbs/yr)
Leafy Vegetables	90	1.5 (0.3)	14	15 (33)
Root Vegetables	90	4 (0.8)	14	140 (309)
Fruit	90	2 (0.4)	14	64 (141)
Grains/Cereals	90	0.8 (0.2)	180	72 (159)

Parameter Values for Consumption of Animal Products

Food Type	Consumption Rate kg/yr (lbs/yr)	Holdup Time (days)	Type	Diet Fraction	Growing Time (days)	Yield kg/m^2 (lbs/ft^2)	Storage Time (days)
Beef	70 (154)	34	Stored Feed	0.25	90	0.8 (0.2)	180
			Fresh Forage	0.75	45	2 (0.4)	100
Poultry	8.5 (19)	34	Stored Feed	1	90	0.8 (0.2)	180
			Fresh Forage	---	---	---	---
Milk	230 (507)	3	Stored Feed	0.25	45	2 (0.4)	100
			Fresh Forage	0.75	30	1.5 (0.3)	0
Eggs	20 (44)	18	Stored Feed	1	90	0.8 (0.2)	180
			Fresh Forage	---	---	---	---

kg/m^2 - kilograms per square meter.
lbs/ft^2 - pounds per square feet.
km/yr - kilometers per year.
lbs/yr - pounds per year.

C.2.3 Airborne Release Parameters

LES provided information on release parameters at the proposed NEF (LES, 2004a). Table C-4 presents design information for each of the effluent release points. The primary release pathways for radioactivity discharged from the facility would be via the Technical Services Building and Separation Building gaseous effluent vent systems. Both of these exhaust stacks, as well as the Technical Services Building Confinement Ventilation System stack, would be located on the Technical Services Building roof. For the proposed NEF, 63 percent of the uranium discharged would be released via the Technical Services Building gaseous effluent vent system, with the remaining 37 percent estimated for the Separations Building gaseous effluent vent system. Only trace amounts of uranium would be associated with the Technical Services Building Confinement Ventilation System and the Centrifuge Assembly Building

Table C-4 Effluent Release Point Design Parameters

Release Point	Stack Exit Area m^2 (ft^2)	Exit Height m (ft)	Building Height m (ft)	Adjacent Building Height m (ft)	Exit Velocity m/sec (ft/min)	Exit Temperature
TSB GEVS	0.29 (3.14)	13 (42.6)	10 (32.8)	10 (32.8)	18.3 (3,600)	Room temp.
SB GEVS	0.13 (1.40)	13 (42.6)	10 (32.8)	10 (32.8)	23.4 (4,600)	Room temp.
CAB CT&PM	0.13 (1.40)	15 (49.2)	12 (39.4)	12 (39.4)	20.3 (4,000)	Room temp.
TSB CVS	0.29 (3.14)	13 (42.6)	10 (32.8)	10 (32.8)	20.3 (4,000)	Room temp.

TSB GEVS - Technical Services Building Gaseous Effluent Vent System.
SB GEVS - Separation Building Gaseous Effluent Vent System.
CAB CT&PM - Centrifuge Assembly Building; Centrifuge Test and Postmortem Facility.
TSB CVS - Technical Services Building Confinement Ventilation System.
m -meter.
m^2 - square meter.
ft - feet.
m/sec - meters per second.
ft/min - feet per minute.
Source: LES, 2004a.

Centrifuge Test and Postmortem Facility exhausts and, as such, would not be expected to release any detectable radioactivity.

The primary component of atmospheric dispersion is mechanical mixing produced by temperature and wind velocity gradients. For projected normal operational releases, the methods of Regulatory Guide 1.111 (NRC, 1977b) are used to estimate concentrations of released material at a range of distances and directions from the release point. These methods use the Gaussian plume dispersion model that is implemented in the XOQDOQ computer code and was applied in this analysis (Sagendorf et al., 1982).

The atmospheric dispersion model XOQDOQ is intended to provide estimates of atmospheric transport and dispersion of gaseous effluents in routine releases from nuclear facilities. XOQDOQ is based on the theory that material released to the atmosphere will be normally distributed (Gaussian distribution) about the plume centerline. In predicting concentrations for longer time periods, the horizontal plume distribution is assumed to be evenly distributed within the directional sector, the so-called sector average model. A straight-line trajectory is assumed between the point of release and all receptors.

The atmospheric dispersion modeling results indicate that the maximum annual average air concentrations would occur at the north sector site boundary approximately 1,014 meters (0.6 mile) north of the Technical Services Building stack with an elevated atmospheric dispersion factor (χ/Q) of 2.3×10^{-6} seconds per cubic meter. Therefore, the individual assumed to be located at the northern sector boundary is the maximally exposed individual for the air pathway. The atmospheric dispersion modeling predicts that the annual average air concentration of releases beyond the site boundary are all less than the northern sector boundary. Concentrations per unit release quantity (i.e., χ/Q) predicted by using this model for the other receptors of concern are summarized in Table C-5.

Table C-5 Summary of Atmospheric Dispersion Factors

Receptor	Location	TSB χ/Q (s/m^3)	SB χ/Q (s/m^3)	Exposure Time (hours)
Nearest Resident	4,233 m (2.6 mi) west	1.4×10^{-7}	1.4×10^{-7}	8,766 hours
Lea County Landfill Worker	917 m (0.6 mi) southeast	1.0×10^{-6}	1.0×10^{-6}	2,000 hours
Wallach Concrete, Inc.	1,867 m (1.2 mi) north-northwest	1.1×10^{-6}	1.3×10^{-6}	2,000 hours
Sundance Services, Inc.	1,706 m (1.1 mi) north-northwest	1.3×10^{-6}	1.4×10^{-6}	2,000 hours
Waste Control Specialists	1,513 m (0.9 mi) east-northeast	4.9×10^{-7}	5.0×10^{-7}	2,000 hours

TSB - Technical Services Building.
SB - Separations Building.
s/m^3 - seconds per cubic meter.
m - meter.
mi - mile.
To convert seconds per cubic meter (s/m^3) to seconds per cubic foot (s/ft^3), multiply by 0.028.

C.3 Radiation Exposures from Normal Operation

Members of the public may be exposed to radioactive material dispersed in the environment through inhalation of air, ingestion of drinking water, ingestion of terrestrial foods and animal products, inadvertent ingestion of soil, and direct irradiation from nuclides deposited on the ground or present in surface water.

LES estimated the expected isotopic release mix resulting from the estimated annual release of 10 grams (0.022 pound) of uranium as shown in Table C-6 (LES, 2004a; LES, 2004c). These values of gaseous effluent are based on operational experience at the Urenco Capenhurst Limited enrichment facility in the United Kingdom. For purposes of the radiological impact analysis, the bounding annual releases to the atmosphere from the proposed NEF site are estimated to be 8.9×10^6 becquerels (240 microcuries). The 8.9×10^6 becquerels (240 microcuries) is a bounding annual release estimate based upon a prior NRC estimate for a 1.5 million separative work unit (SWU) plant (NRC, 1994). The proposed NEF design is based upon the prior design but with a doubling of the enrichment capacity to 3 million SWU. The expected isotopic release resulting from the bounding annual release of 8.9×10^6 becquerels (240 microcuries) of uranium from the Technical Services Building and Separations Building Gaseous Effluent Vent Systems is also shown in Table C-6. For gaseous effluents resulting from the sublimation of UF_6, no significant amount of radioactive particulate material (uranium or its radioactive decay daughters) would be expected to be introduced into the process ventilation system and released to the environment after Gaseous Effluent Vent System filtration (LES, 2004a).

Table C-6 Annual Effluent Releases

Radionuclide	Estimated Releases[a]		Bounding Releases	
	TSB GEVS kBq/yr (µCi/yr)	SB GEVS kBq/yr (µCi/yr)	TSB GEVS kBq/yr (µCi/yr)	SB GEVS kBq/yr (µCi/yr)
Uranium-234	77.7 (2.10)	45.5 (1.23)	2,738 (74.0)	1,591 (43.0)
Uranium-235	3.59 (0.097)	2.11 (0.057)	125.8 (3.4)	74.0 (2.0)
Uranium-236	0.48 (0.013)	0.30 (0.008)	17.0 (0.46)	11.1 (0.3)
Uranium-238	77.7 (2.10)	45.5 (1.23)	2,738 (74.0)	1,591 (43.0)
Total	159.5 (4.31)	93.6 (2.53)	5,619 (151.86)	3,267 (88.3)

[a] Source: LES, 2004a. Equivalent to 10 grams (0.022 pound) uranium.
TSB GEVS - Technical Services Building Gaseous Effluent Vent System.
SB GEVS - Separation Building Gaseous Effluent Vent System.
kBq/yr - kilobecquerels per year.
µCi/yr - microcuries per year.

C.3.1 Exposure to Members of the Public

Radioactive material would be released to the atmosphere from the proposed NEF site through stack releases from the Technical Services Building Gaseous Effluent Vent System, Separations Building Gaseous Effluent Vent System, and from the potential resuspension of contaminated soil within the Treated Effluent Evaporative Basin. While a member of the public would not be expected to spend a significant amount of time at the site boundary closest to the UBC Storage Pad, this possibility is included in this impact assessment. The expected exposure pathways include inhalation of air and direct exposure from material deposited on the ground. In addition to these expected routes of exposure, members of the public may also consume food containing deposited radionuclides and inadvertently ingest resuspended soil from the ground or on local sources of food (e.g., leafy vegetables, carrots, potatoes, and beef from nearby grazing livestock). Potential effective dose equivalents for the maximally exposed adult individuals of Table C-5 and for the population are provided in Table C-7. The general population within 80 kilometers (50 miles) of the proposed NEF would receive a collective dose of 0.014 person-rem, equivalent to 8.4×10^{-6} latent cancer fatalities (LCF) from normal operations.

LES calculated the dose isopleths for the case of a 30-year stockpile of UBCs with 2,000 hours of exposure as shown in Figure C-3 (LES, 2004a). The greatest dose from direct radiation would be for a receptor on the northern site boundary at centerline of the northern edge of the UBC Storage Pad. Because the nearest resident would be 4,233 meters (2.6 miles) from the UBC Storage Pad, with a reduction in dose rates on the order of 6×10^{-8} due to distance alone, the potential impact of direct radiation from stored cylinders on the surrounding population is considered to be negligible. However, three industrial sites would be in direct line-of-sight and within 1.6 kilometers (1 mile) of the UBC Storage Pad. Using the 0.2-millisievert (20-millirem) isopleths from Figure C-3, the direct radiation for these receptors is estimated for reduction in dose versus distance for 2,000 hours per year and provided in Table C-7.

For the potential of contaminated soil at the bottom of the Treated Effluent Evaporative Basin to be resuspended by wind blowing over the basin, the health impacts based on 30 years of 0.57 kilogram (1.26 pounds) per year of uranium being placed into the Treated Effluent Evaporative Basin soil were reviewed. The resulting 30-year inventory of 7.4 microcuries of uranium, combined with a resuspension factor of 4×10^{-6} per hour, results in an additional annual effective dose of 1.7×10^{-6} millisieverts (1.7×10^{-4}

millirems) to the nearest resident with the largest offsite dose of 1.7×10^{-5} millisieverts (1.7×10^{-3} millirems) (LES, 2004a) at the southern site boundary. Variations in the resuspension factor for the outdoors absorbed on soil could only be as high as 9×10^{-5} per hour for areas that are fairly open to the prevailing winds (DOE, 1994). Since the Treated Effluent Evaporative Basin would be a sunken basin (i.e., below ground level) with a net covering the basin, the ability of prevailing winds to resuspend contaminated soils is expected to be less than that assumed by LES and the resulting impacts are considered conservative.

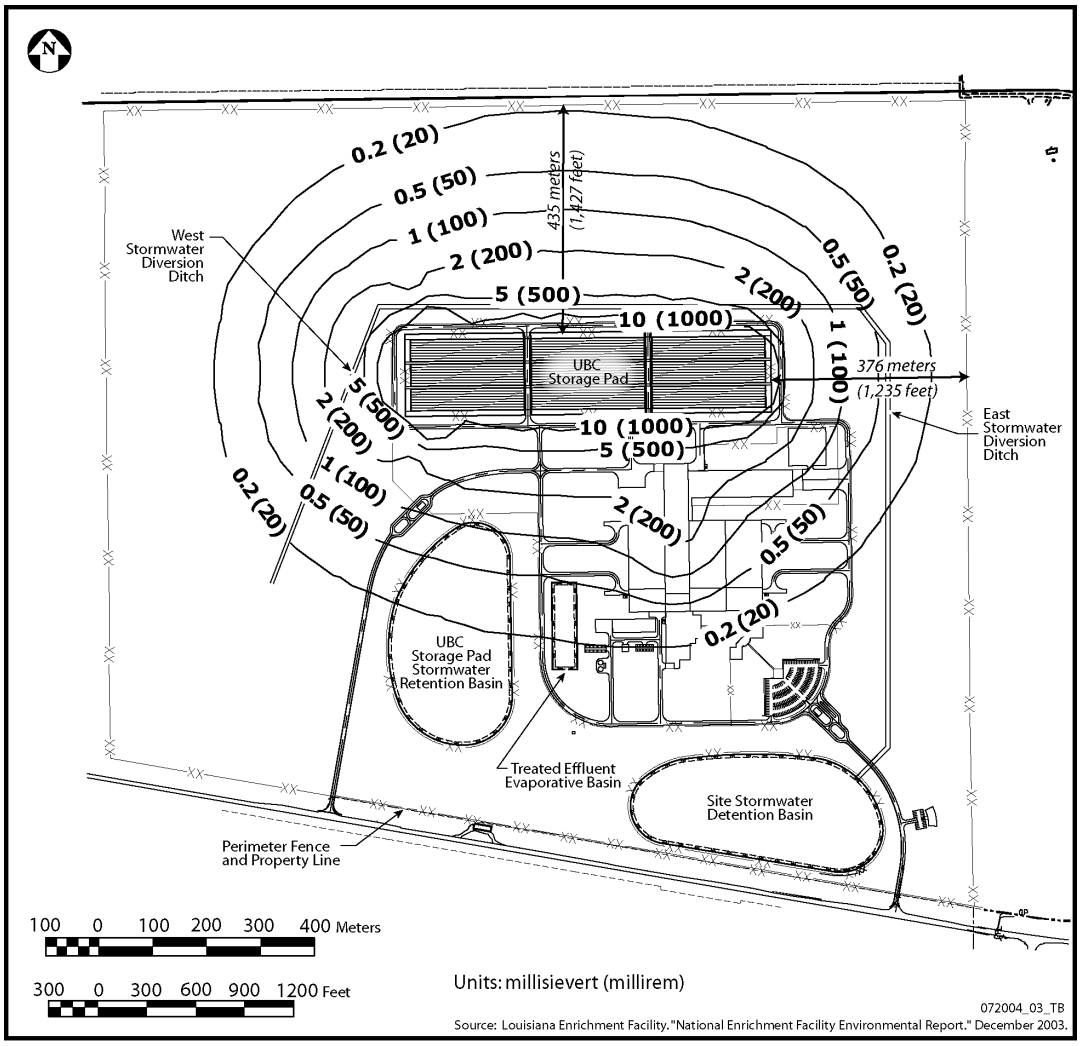

Figure C-3 2,000-Hour Dose Isopleths for a 30-Year Stockpile of Uranium Byproduct Cylinders (LES, 2004a)

Normal operations at the proposed NEF would have SMALL impacts to public health. The total annual dose from all exposure pathways would be significantly less than the regulatory requirement of 1 millisievert (0.1 rem) of 10 CFR § 20.1301. The most significant impact is from direct radiation exposure to receptors close to the UBC Storage Pad (filled and empty Type 48Y cylinders). The results

are based on conservative assumptions, and it is anticipated that actual exposure levels will be less than those presented in Table C-7.

Table C-7 Radiological Impacts to Members of the Public Associated Within Operation of the Proposed NEF

Receptor	Location from Proposed NEF Stacks	Airborne Pathway CEDE	Direct Radiation [a]	Total Annual Impact
Population, Person-Sv (person-rem)	Within 80.5 km (50 mi) of Proposed NEF	1.4×10^{-4} (1.4×10^{-2})	N/A	1.4×10^{-4} (1.4×10^{-2})
Highest Boundary (Stack Releases), mSv (mrem)	Northern Boundary 1,010 m (0.6 mi)	5.3×10^{-5} (5.3×10^{-3})	0.189 (18.9)	0.189 (18.9)
Nearest Resident [b], mSv (mrem)	4,233 m (2.6 mi) west	1.3×10^{-5} (1.3×10^{-3})	N/A	1.3×10^{-5} (1.3×10^{-3})
Lea County Landfill Worker, mSv (mrem)	917 m (0.57 mi) southeast	1.9×10^{-5} (1.9×10^{-3})	N/A	1.9×10^{-5} (1.9×10^{-3})
Wallach Concrete, Inc. mSv (mrem)	1,867 m (1.16 mi) north-northwest	2.2×10^{-5} (2.2×10^{-3})	0.021 (2.1)	0.021 (2.1)
Sundance Services, Inc., mSv (mrem)	1,706 m (1.06 mi) north-northwest	2.6×10^{-5} (2.6×10^{-3})	0.026 (2.6)	0.026 (2.6)
Waste Control Specialists, mSv (mrem)	1,513 m (0.94 mi) east-northeast	9.3×10^{-6} (9.3×10^{-4})	0.021 (2.1)	0.017 (1.7)

[a] Direct radiation from the maximum number of UBCs over the lifetime of the proposed NEF.
[b] Includes airborne contamination from the Treated Effluent Evaporative Basin.
Sv - sievert.
mSv - millisievert.
mrem - millirem.
km - kilometer.
mi - mile.

For comparison to the effects from a similar facility, the Urenco enrichment facility in Capenhurst, United Kingdom (total capacity of 2.96 million SWU), can be considered. The Ministry of Agriculture, Fisheries and Food of the Scottish Environment Protection Agency monitors gaseous and liquid emissions from the Capenhurst facility and annually estimates radiological impacts. According to available reports from 1998 through 2002, a radiation dose to the maximum exposed individual was estimated to be less than 0.005 millisievert (0.5 millirem) per year for ingestion of terrestrial food contaminated via gaseous effluents (LES, 2004a). The highest radiation dose to the maximum exposed individual was estimated to be less than 0.011 millisievert (1.1 millirem) per year for ingestion of liquids being released from the Capenhurst site, assuming children played near the brook along the site and ingested water and sediment (LES, 2004c). Therefore, the proposed NEF will have less of an impact to the public than the Capenhurst facility because, unlike at Capenhurst, members of the public would not be directly exposed to liquid discharges or by the site boundary for extended periods of time. More

importantly, both sets of annual doses are significantly below the U.S. regulatory requirement of 1 millisievert (100 millirem) (10 CFR Part 20) or 0.25 millisievert (25 millirem) for uranium fuel-cycle facilities (40 CFR Part 190).

C.3.2 Occupational Exposure Due to Normal Operation

The regulations of 10 CFR Part 20 not only require an NRC licensee to have an effective radiation protection program (10 CFR § 20.1101) but also require annual reports on the facility's occupational exposures (10 CFR § 20.2206) that the NRC gathers, evaluates, and presents in new volumes of NUREG-0713. By analyzing the sources of radiation and having an effective and efficient radiation protection program to determine the potential occupational dose rates, a licensee can determine whether any special administrative controls need to be applied to a specific individual or site-wide to maintain workers below the regulatory and company-set exposure limits. In addition to estimates of the occupational exposure, a comparison to the historical exposure data from similar facilities can demonstrate the effectiveness of the administrative controls (i.e., the radiation protection program) and/or the level of impacts that would be expected from a similar facility. In addition to the occupational exposure data from NUREG-0713 for the current U.S. enrichment facilities, the historical data from the Urenco Almelo and Capenhurst facilities would also be used for a comparison of impacts.

Tables C-8 and C-9 present the estimated occupational dose rates and annual exposures for various locations or buildings within the proposed NEF site and representative workers, respectively. Sections 4.7.6 and 4.8.1 of the Safety Analysis Report (LES, 2004b) describe the personnel-monitoring program for internal exposure from intake of soluble uranium. An annual administrative limit of 10 millisieverts (1,000 millirems) that includes external radiation sources and internal exposure from no more than 10 milligrams of soluble uranium in a week would be applied for comparison with the LES occupational exposure results, the historical data for past occupational exposures at U.S. enrichment facilities are shown in Table C-10, while comparisons to historical data for European and U.S. enrichment facilities are shown in Tables C-11 and C-12.

Table C-8 Estimated Occupational Dose Rates for Various Locations or Buildings Within the Proposed NEF

Location	Dose Rate, mSv/hr (mrem/hr)
Plant General Area (Excluding Separations Building Modules)	< 0.0001 (< 0.01)
Separations Building Module - Cascade Halls	0.0005 (0.05)
Separations Building Module - UF_6 Handling Area and Process Services Area	0.001 (0.1)
Empty Used UF_6 Shipping Cylinder	0.1 (10.0) on contact 0.010 (1.0) at 1 meter (3.3 feet)
Full UF_6 Shipping Cylinder	0.05 (5.0) on contact 0.002 (0.2) at 1 meter (3.3 feet)

mSv/hr - millisieverts per hour; mrem/hr - millirems per hour.
Source: LES, 2004a.

Table C-9 Estimated Occupational Annual Exposures for Various Occupations Within the Proposed NEF

Position	Annual Dose Equivalent[a] mSv (mrem)
General Office Staff	< 0.05 (< 5.0)
Typical Operations and Maintenance Technician	1 (100)
Typical Cylinder Handler	3 (300)

[a] The average worker exposure at the Urenco Capenhurst facility during the years 1998 through 2002 was approximately 0.2 mSv (20 mrem) (LES, 2004a).
mSV - millisievert; mrem - millirem.
Source: LES, 2004a.

Table C-10 Annual CEDE and TEDE for Uranium Enrichment Plants Within the United States for 1997 - 2002

Year	Number with Meas. CEDE	Collective CEDE (person-rem)	Avg. Meas. CEDE (rem)	Number Meas. Exposure	Total Number Monitored	Number with Meas. Dose	Total Collective TEDE (person-rem)	Avg. Meas. TEDE (rems)
1997	36	0.314	0.01	5,705	6,296	591	30.003	0.051
1998	58	0.242	0	5,713	6,150	437	23.621	0.054
1999	22	0.445	0.02	5,119	5,559	440	20.124	0.046
2000	69	0.587	0.01	4,015	5,016	1002	28.356	0.028
2001	53	0.108	0	3,670	4,015	345	10.325	0.030
2002	40	0.208	0.01	3,190	3,683	493	20.601	0.042

To convert rem to sievert, multiply by 0.01.
Source: NRC, 1998a; NRC, 1999; NRC, 2000; NRC, 2001a; NRC, 2002; NRC, 2003a.

Table C-11 Comparison of Annual Maximum TEDE for Capenhurst and U.S. Enrichment Facilities

Year	Capenhurst Maximum TEDE Sv (rem)	Highest Whole Body Doses at U.S. Enrichment Facilities Sv (rem) [a]
1998	0.0031 (0.31)	0.0025-0.005 (0.25-0.5)
1999	0.0022 (0.22)	0.0025-0.005 (0.25-0.5)
2000	0.0028 (0.28)	0.001-0.0025 (0.1-0.25)
2001	0.0027 (0.27)	0.001-0.0025 (0.1-0.25)
2002	0.0023 (0.23)	0.0025-0.005 (0.25-0.5)

[a] NUREG-0713 provides 12 dose ranges and the respective number of workers with whole body doses in that range. The value given in this column is the highest whole body dose range for that year.
[b] Five-year average (1998-2002) using the average TEDE from Table 4.13.2.2-1 o f the Safety Analysis Report.
Sv - Seivert.
Source: LES, 2004a; LES, 2004b; NRC, 1999; NRC, 2000; NRC, 2001a; NRC, 2002; NRC, 2003a.

Table C-12 Comparison of Annual Average TEDE for Almelo, Capenhurst, and U.S. Enrichment Facilities

Almelo TEDE Sv (rem)	Capenhurst TEDE Sv (rem)	U.S. Enrichment Facilities Sv (rem)
0.0004 (0.04)	0.0002 (0.02)	0.0004 (0.04) [a]

[a] Five-year average (1998-2002) using the average TEDE from Table 4.13.2.2-1 of the Safety Analysis Report.
Sv - Seivert.
Sources: LES, 2004a; LES, 2004b, NRC, 1999; NRC, 2000; NRC, 2001a; NRC, 2002; NRC, 2003a.

The LES occupational exposure analysis, as collaborated by the historical exposure data, demonstrates that a properly administered radiation protection program at the proposed NEF should maintain the radiological occupational impacts well below the regulatory limits of 10 CFR § 20.1201. Therefore, the impacts from occupational exposure at the proposed NEF would be considered SMALL.

C.4 Public and Occupational Health Impacts from Accidents During Operations

The operation of the proposed NEF would involve risks to workers, the public, and the environment from potential accidents. The regulations in 10 CFR Part 70, Subpart H, "Additional Requirements for Certain Licensees Authorized to Possess a Critical Mass of Special Nuclear Material," require that each applicant or licensee evaluate, in an Integrated Safety Analysis, its compliance with certain performance requirements. The purpose of this section of this Draft EIS is to summarize the methods and results used to independently evaluate the consequences of potential accidents identified in LES's Integrated Safety Analysis. The accidents evaluated are a representative selection of the types of accidents that are possible at the proposed NEF.

C.4.1 Accident Analysis Methodology

The analytical methods used in this consequence assessment are based on NRC guidance for analysis of nuclear fuel-cycle facility accidents (NRC, 1990; NRC, 1991; NRC, 1998b; NRC, 2001b). With the exception of the criticality accident, the hazards evaluated involve the release of UF_6 vapor from process systems that are designed to confine UF_6 during normal operations. As described below, UF_6 vapor poses a chemical and radiological risk to workers, the public, and the environment.

C.4.1.1 Selection of Representative Accident Scenarios

The Safety Analysis Report and Emergency Plan (LES, 2004a; LES, 2004b) describe potential accidents that could occur at the proposed NEF. Accident descriptions are provided for two groups according to the severity of the accident consequences: high-consequence events and intermediate-consequence events. The accident types are summarized in the Emergency Plan as follows:

High-Consequence Events

- Earthquake.
- Tornado.
- Flood.
- Inadvertent Nuclear Criticality.
- Fires Propagating Between Areas.
- Fires Involving Transient Combustibles.
- Heater Controller Failure.
- Overfilled Cylinder Heated to Ambient Temperature.
- Product Liquid Sampling Autoclave Heater Failure Followed by Reheat.
- Open Sample Manifold Purge Valve and Blind Flange.
- Pump Exhaust Plugged.
- UF_6 Subsampling Unit Hot Box Heater Controller Failure.

Intermediate-Consequence Events

- Carbon Trap Failure.
- Chemical Dump Trap Failure.
- Pump Exhaust Plugged.
- Spill of Failed Centrifuge Parts.
- Dropped Contaminated Centrifuge.
- Empty UF_6 Cold Trap (UF_6 Release).
- Fire in Ventilated Room.

A subset of the potential accident scenarios was selected for detailed evaluation to encompass the range of possible accidents. The accident sequences selected vary in severity from high to low consequence events and include accidents initiated by natural phenomena, operator error, and equipment failure. The accident sequences evaluated are as follows:

- Generic Inadvertent Nuclear Criticality.
- Hydraulic Rupture of a UF_6 Cylinder in the Blending and Liquid Sampling Area.
- Natural Phenomena Hazard–Earthquake.
- Fire in a UF_6 Handling Area.
- Process Line Rupture in a Product Low-Temperature Takeoff Station.

C.4.1.2 Source-Term Methodology

For most accidents, the UF_6 vapor is assumed to escape its primary confinement system and enter an occupied room at the proposed NEF. It is assumed that UF_6 would mix instantaneously with the air in the room.

For a constant release rate of UF_6, the time-dependent concentration, C(t), of UF_6 in a room or workshop at the proposed NEF would be (NRC, 1990):

$$\frac{dC(t)}{dt} = \frac{R}{V'} - \frac{Q_v f_v C(t)}{V'} \qquad \text{Eq. C-1}$$

where R = constant UF_6 release rate, grams/second
V′ = k×f×V, the effective room volume, cubic meters
V = actual room volume, cubic meters
k = mixing efficiency (from National Fire Protection Association 69 [NFPA, 2002], Appendix D), unitless
f = room free air fraction, unitless
Q_v = room ventilation rate, cubic meters per second

f_v = the fraction of Q_v exhausted to the atmosphere
($1-f_v$ is recycled back into the room)
t = time elapsed since start of release, seconds

The values of mixing efficiency, k, and room free-air fraction, f, are assumed to be 0.3 and 0.8, respectively. The mixing efficiency is conservatively based on Table D-1 of National Fire Protection Association 69 (NFPA, 2002), and is for ventilation systems with forced-air supplies and single exhaust openings comprised of grills and registers. The value of 0.8 is assumed to account for the volume of equipment that replaces free air inside the facility. Room volumes and ventilation flow rates were provided by LES (LES, 2004d). The fraction of air exhaust is 10 percent, which is consistent with the heating, ventilation, and air-conditioning descriptions in Chapters 3 and 4 of the Safety Analysis Report (LES, 2004a).

A solution to Equation C-1 is:

$$C_1(t) = \frac{R}{Q_v f_v}\left[1 - e^{-\frac{Q_v f_v}{V'}t}\right] \qquad \text{Eq. C-2}$$

Equation C-2 defines the concentration, $C_1(t)$, during the period that UF_6 is released at a steady-state rate, R, into a room. After T_1 = 30 minutes, it is assumed that either the entire material at risk would be released or the release would be stopped when operators intervene. The assumption that operators or affected individuals downwind would respond within 30 minutes is consistent with conservative self-protective criteria used by NRC to evaluate emergency preparedness (NRC, 1988). After T_1 = 30 minutes, the room would be ventilated until UF_6 is cleared from the room and exhausted to the environment. The room concentration, $C_2(t)$, after all the material escapes to the room, or the release is stopped is:

$$C_2(t) = \frac{R}{Q_v f_v}\left[1 - e^{-\frac{Q_v f_v T_1}{V'}}\right] e^{-\frac{Q_v f_v}{V'}t} \qquad \text{Eq. C-3}$$

For the seismic event, LES has proposed safety-related equipment (i.e., Items Relied on for Safety) that shut down the heating, ventilation, and air-conditioning systems in certain process areas. With no forced ventilation, the primary means by which UF_6, compound uranyl fluoride (UO_2F_2) particulate matter, and hydrogen fluoride vapor enters the environment would be from small cracks and openings in the building.

The volumetric leak rate from small cracks and openings in a building is calculated by evaluating Poiseuille's Law (Baker, 1987):

$$Q_L = -\left(\frac{12\eta d L_S}{C\rho W}\right) + \sqrt{\left(\frac{12\eta d L_S}{C\rho W}\right)^2 + \frac{C_{p,a} v^2 W^2 L_S^2}{C}} \qquad \text{Eq. C-4}$$

where Q_L = volumetric leak rate, cubic meters per second
L_s = perimeter length of all exterior doors, meters
W = width of the opening between door and frame, meters
η = coefficient of viscosity of air = 1.81×10^{-5} N-seconds per square meter at T = 20°C (68°F)
d = thickness of doors, meters
C = 1.5
ρ = density of air = 1.183 kilograms per cubic meter at T = 25°C (77°F)
v = wind speed, meters per second

The value of $C_{p,a}$ depend on the location of the door or opening relative to the direction of the wind (Blevins, 2003):

where $C_{p,a}$ = 0.9 for windward side of the building
$C_{p,a}$ = -0.3 for leeward side of the building
$C_{p,a}$ = -0.4 for building sides orthogonal to the wind direction

For this assessment, each exterior door in affected process areas of the building is assumed to have a W = 0.2 centimeter (.06 inch) opening around both sides and the top, and a W = 0.3 centimeter (.13 inch) opening at the bottom. The thickness of all doors, d, is estimated to be 5 centimeters (2 inches). The perimeter length of doors is estimated from drawings in the Safety Analysis Report (LES, 2004a).

The wind speed, v, assumed for the building leakage calculations was chosen with consideration of the wind speed and stability class assumed in the derivation of the maximum atmospheric dispersion factor, χ/S. The highest χ/S calculated for the controlled area boundary is 5.4×10^{-5} seconds per cubic meter. With corrections for building wake and low wind speed plume meander, the wind speed for F class stability conditions for which a $\chi/S = 5.4\times10^{-5}$ seconds per cubic meter would be derived is 1.75 meters per second (5.7 feet per second). Therefore, a bounding value of v = 2 meters per second (6.6 feet per second) is used to estimate building leakage.

Solid UO_2F_2 produced by the reaction of UF_6 with water vapor (i.e., humidity) forms a fine powder that will settle by gravity. Therefore, in addition to removal by exfiltration through door cracks to the environment, solid UO_2F_2 will also be removed from the air by settling on the floor and equipment of the affected process area. The concentration in the building is calculated as:

$$C_L(t) = C_{L,O}e^{-\frac{1}{V'}(Q_L + v_d A)t} \qquad \text{Eq. C-5}$$

where v_d = settling velocity of UO_2F_2 particles in air, meters per second
A = floor area of the affected process area, square meters

From Table 12.4 of DOE/TIC-27601 (DOE, 1984), the settling velocity of fine uranium compounds estimated to be approximately 0.0001 centimeter per second (0.0002 feet per minute). The floor areas of the affected process areas are estimated from drawings in the Safety Analysis Report (LES, 2004a).

C.4.1.3 NRC Performance Requirements

The performance requirements in 10 CFR Part 70, Subpart H, define acceptable levels of risk of accidents at nuclear fuel-cycle facilities, such as the proposed NEF. The regulations in Subpart H require that LES reduce the risks of credible high-consequence and intermediate-consequence events. Threshold consequence values that define the high- and intermediate-consequence events for the proposed NEF are described in Table C-13(LES, 2004a).

Table C-13 Definition of High- and Intermediate-Consequence Events at the Proposed NEF

Receptor	Intermediate Consequence	High Consequence
Worker - Radiological	> 25 rem (0.25 Sv)	> 100 rem (1 Sv)
Worker - Chemical (5-minute exposure)	> 2.4 mg U intake > 98 mg HF/m^3	> 30 mg U intake > 175 mg HF/m^3
Environment at the Restricted Area Boundary	> 5.4 mg U/m^3 or 24-hour average release greater than 5,000 times the values in Tables 2 of Appendix B of 10 CFR Part 20	N/A
Individual at the Controlled Area Boundary - Radiological	> 5 rem (0.05 Sv)	> 25 rem (0.25 Sv)
Individual at the Controlled Area Boundary - Chemical (30-minute exposure)	> 1.4 mg U intake > 0.8 mg HF/m^3	> 7.8 mg U intake > 28 mg HF/m^3

Sv - sievert; HF - hydrogen fluoride; U - uranium.
mg - milligram.
m^3 - cubic meters.

C.4.1.4 Consequence Assessment Methodology for Acute Health Effects

Accident consequences were evaluated for the proposed NEF facility worker, the environment outside the restricted area boundary, an individual at the controlled area boundary, and the public beyond the controlled area boundary. As stated above, the analytical methods used in this consequence assessment are based on NRC guidance for analysis of nuclear fuel-cycle facility accidents (NRC, 1990; NRC, 1991; NRC, 1998b; NRC, 2001b).

Facility Worker Uranium Intake and Exposure to Hydrogen Fluoride

The accident consequences to a facility worker include the risks of toxicological effects of uranium intake, radiation dose from uranium intake, and exposure to hydrogen fluoride concentration in air. The amount of uranium a facility worker could inhale (uranium intake) is calculated by assuming the worker is exposed to $C_1(t)$ until T_1 = 5 minutes after the start of the release (LES, 2004a). By T_1 = 5 minutes, a worker is assumed to successfully escape the affected room. The uranium intake is calculated by assuming the worker inhales at a constant breathing rate of 3.33×10^{-4} cubic meters per second (20 liters per minute), which is consistent with the breathing rate used by NRC in 10 CFR Part 20, Appendix B, for Reference Man performing "light work." Similarly, the hydrogen fluoride concentration to which a facility worker could be exposed is calculated by evaluating the time-averaged hydrogen fluoride concentration during the first T_1 = 5 minutes.

For the uranium intake and hydrogen fluoride exposure calculations, it is assumed that sufficient moisture (i.e., humidity) is present in the room to completely convert released UF_6 gas to UO_2F_2 particulate matter and hydrogen fluoride vapor. This assumption results in a conservative estimate of the concentration of hydrogen fluoride vapor that would be present in both the affected room of the proposed NEF and downwind.

Restricted Area Boundary 24-Hour Average Uranium Concentration

In accordance with 10 CFR Part 70, Subpart H, LES must reduce the environmental risks of accidents. The environmental consequences of accidents are evaluated at the restricted area boundary. At the proposed NEF, the restricted area boundary would be a fenced area inside the controlled area that would include the process buildings and the UBC Storage Pad (LES, 2004d). To evaluate whether accidents would exceed the environmental performance requirement, the 24-hour average uranium concentration is calculated at the restricted area boundary. It is assumed that the points of release are the stacks on the roof of the Technical Services Building.

The total source term for the first phase of the event (before the release is stopped) is S_1. The residual source term from the time that the release is stopped, T_1, until the source is either depleted, or until 24 hours has elapsed, is S_2.

$$S_1 = \int_0^{T_1} S_1(t)dt = \int_0^{T_1} C_1(t)dt \times Q_v \times f_v = R\left[T_1 - \frac{V'}{Q_v f_v}\left\{1 - e^{-\frac{Q_v f_v T_1}{V'}}\right\}\right], \quad for\ 0 < t \le T_1$$

Eqs. C-6, C-7

$$S_2 = \int_{T_1}^{T_2} S_2(t)dt = \int_{T_1}^{T_2} C_2(t)dt \times Q_v \times f_v = R\left[1 - e^{-\frac{Q_v f_v T_1}{V'}}\right]\left[\frac{V'}{Q_v f_v}\left\{1 - e^{-\frac{Q_v f_v (T_2 - T_1)}{V'}}\right\}\right], \quad for\ T_1 < t \le T_2$$

To compare downwind concentrations with the applicable performance requirement, the uranium concentration downwind is calculated as a 24-hour average. For the restricted area boundary and the controlled area boundary, the atmospheric dispersion factor (χ/S) for various distances from the proposed NEF process buildings to the boundary in each downwind sector is calculated using ARCON96 (NRC, 1997). The distance to the restricted area boundary and controlled area boundary in each compass sector, the persistence of the wind in each direction, and χ/S values calculated using ARCON96 are presented in Table C-14. The highest χ/S at the restricted area boundary, which would result in the highest downwind concentration, occurs directly east of the Technical Services Building. Therefore, the concentration at the restricted area boundary is calculated for wind blowing to the east.
The downwind concentration at the restricted area boundary is calculated for the downwind sector with the highest atmospheric dispersion factor ($\chi/S|_{RAB}$) using Equation C-8.

$$U, \frac{mg}{m^3}\bigg|_{RAB} = \frac{\left[\int_0^{T_1} S_1(t)dt + \int_{T_1}^{T_2=24hr} S_2(t)dt\right]}{\int_0^{T_2=24hr} dt}, \frac{g}{s} \times \frac{\chi}{S}\bigg|_{RAB}, \frac{s}{m^3} \times 10^3 \frac{mg}{g} \times 0.68 \frac{mg\,U}{mg\,UF_6} \qquad \text{Eq. C-8}$$

Table C-14 Accident Values of Atmospheric Dispersion Factors for the Proposed NEF Boundaries

Direction from Facility	Distance from Proposed NEF		Frequency of Wind (percent)	RAB χ/S (s/m^3)	CAB χ/S (s/m^3)
	RAB meters (feet)	CAB meters (feet)			
S	160 (524)	417 (1,368)	5.66	2.64×10^{-4}	4.84×10^{-5}
SSW	168 (552)	417 (1,368)	3.98	2.40×10^{-4}	4.80×10^{-5}
SW	210 (690)	422 (1,384)	4.91	1.69×10^{-4}	5.37×10^{-5}
WSW	261 (856)	503 (1,650)	4.87	1.14×10^{-4}	4.08×10^{-5}
W	261 (856)	769 (2,522)	6.29	1.14×10^{-4}	2.37×10^{-5}
WNW	278 (911)	1,071 (3,513)	5.52	9.96×10^{-5}	1.46×10^{-5}
NW	757 (2,484)	1,072 (3,516)	7.52	2.12×10^{-5}	1.34×10^{-5}
NNW	639 (2,098)	995 (3,264)	10.80	2.35×10^{-5}	1.13×10^{-5}
N	589 (1,932)	995 (3,264)	20.40	2.67×10^{-5}	1.18×10^{-5}
NNE	530 (1739)	754 (2473)	7.35	3.08×10^{-5}	1.77×10^{-5}
NE	463 (1,518)	581 (1,906)	5.46	3.78×10^{-5}	2.61×10^{-5}
ENE	362 (1,187)	540 (1,771)	4.68	4.96×10^{-5}	2.61×10^{-5}
E	109 (359)	540 (1,771)	4.45	4.49×10^{-4}	2.68×10^{-5}
ESE	101 (331)	540 (1,771)	2.42	4.26×10^{-4}	2.54×10^{-5}
SE	143 (469)	487 (1,597)	2.69	2.76×10^{-4}	3.10×10^{-5}
SSE	185 (607)	417 (1,368)	3.04	1.70×10^{-4}	3.95×10^{-5}

RAB - restricted area boundary.
CAB - controlled area boundary.
s/m^3 - seconds per cubic meter.
To convert seconds per cubic meter (s/m^3) to seconds per cubic foot (s/ft^3), multiply by 0.028.

Controlled Area Boundary Uranium Intake and Hydrogen Fluoride Exposure

The accident consequences to an individual at the controlled area boundary include the risks of toxicological effects of uranium intake, radiation dose from uranium intake, and exposure to hydrogen fluoride concentration in air. The uranium intake at the controlled area boundary is calculated for the downwind sector with the highest atmospheric dispersion factor ($\chi/S|_{CAB}$). The highest χ/S at the controlled area boundary, which would result in the highest downwind concentration, occurs southwest of the Technical Services Building. Therefore, the accident consequences at the controlled area boundary are calculated for wind blowing to the southwest.

The uranium intake at the controlled area boundary is calculated for the first 24 hours of the event using Equation C-9.

$$[HF], one\ hour = \frac{\left[\int_0^{T_1} S_1(t)dt + \int_{T_1}^{T_2=1hr} S_2(t)dt\right], g}{1{,}800\,s}, \frac{g}{s} \times \left.\frac{X}{S}\right|_{CAB}, \frac{s}{m^3} \times 10^3 \frac{mg}{g} \times 0.23 \frac{mg\ HF}{mg\ UF_6} \qquad \text{Eq. C-9}$$

Similarly, the unmitigated 30-minute average hydrogen fluoride concentration is:

$$U\ intake, mg = \left[\int_0^{T_1} S_1(t)dt + \int_{T_1}^{T_2=24hr} S_2(t)dt\right], g \times \left.\frac{X}{S}\right|_{CAB}, \frac{s}{m^3} \times 10^3 \frac{mg}{g} \times B.R., \frac{m^3}{s} \times 0.68 \frac{mg\ U}{mg\ UF_6} \qquad \text{Eq. C-10}$$

C.4.1.5 Consequence Assessment Methodology for Chronic Health Effects

Earlier studies have indicated that if fatality from suffocation caused by edema (swelling) in the lungs does not occur, the swelling resulting from hydrogen fluoride exposure will subside and recovery should be complete. Thus, acute sublethal inhalation of hydrogen fluoride is not expected to have long-term effects (NRC, 1991). Therefore, the post-accident chronic health effects evaluated are limited to the toxicological and radiological health effects to members of the public offsite resulting from exposure to uranium compounds.

Human toxicological effects of exposure to soluble uranium compounds have also been previously reviewed by the NRC (NRC, 1991). It was concluded that a single acute intake of 10 milligrams of soluble uranium would produce in humans either minimal or nondetectable effects, either short-term or long-term. Therefore, if an accident could not result in acute intakes above 10 milligrams of soluble uranium in any individual at or just beyond the site (controlled area) boundary, then no long-term health effects would be expected among the exposed population further downwind. At the proposed NEF, only one type of event is capable of causing toxicological effects among the offsite public from exposure to soluble uranium—the rupture of a large UF_6 cylinder from inadvertent overheating or overfilling. The protective measures proposed by LES to prevent this type of event are described in Section 4.2.13.2 of Chapter 4 of this Draft EIS.

GENII v. 1.485 (Napier et al., 1988) is used to estimate collective radiation doses (person-rem) to members of the public resulting from post-accident inhalation and ingestion of soluble uranium compounds. The same exposure pathways, ingestion parameters, and demographic information used for Section 4.2.12 of Chapter 4 of this Draft EIS are applied to estimate radiological doses to the public from accidents. The meteorological data is taken from the nearby Midland-Odessa National Weather Station.

For dose calculations to the public, it is assumed that individuals downwind spend 100 percent of the time inside the passing plume (i.e., not sheltered). For releases of uranium compounds, it is found that the north sector would have the highest collective doses because Hobbs, New Mexico, is a large population center in the prevailing downwind direction.

C.4.2 Accident Analyses

C.4.2.1 Inadvertent Nuclear Criticality

An inadvertent nuclear criticality at the proposed NEF would result from the unintended accumulation of enriched uranium, leading ultimately to a self-sustaining or runaway nuclear chain reaction. A criticality accident could release large amounts of heat and radiation. A criticality accident could also produce radioactive fission products, such as isotopes of noble gases like xenon and krypton, radioiodine, and radiocesium. At the proposed NEF, one process area for which this accident is postulated is the Decontamination Workshop.

Specifically, the accumulation of uranium in the citric acid tank could cause a criticality accident. For this to occur, the operator would have to fail to control the uranium mass in the tank. A criticality in the solution in the tank could produce an initial burst of $1.0\times10^{+18}$ fissions, followed by 47 bursts of $1.92\times10^{+17}$ fissions per burst, for a total of $1.0\times10^{+19}$ fissions in 8 hours (NRC, 1998b).

The source term (ST) for the inadvertent nuclear criticality was determined using the five-factor formula:

$$ST = MAR \times DR \times ARF \times RF \times LPF \qquad \text{Eq. C-11}$$

where MAR = material at risk
DR = damage ratio
ARF = airborne release fraction
RF = respirable fraction
LPF = leak path factor

For the criticality accident, the material at risk (MAR) is the amount of fission product radioactivity that would accumulate during the event (NRC, 1998b). The damage ratio (DR) is 1, since all of the solution in the tank would be involved in the event. The atmospheric release fraction (ARF) for noble gases is 100 percent. The ARF for radioiodine is 0.25, and the ARF for other fission products is 5×10^{-4} (NRC, 1998b). The respirable fraction is assumed to be 100 percent. A leak path factor (LPF) of 0.001 is used for radioiodine and fission products other than noble gases, since the Technical Services Building gaseous effluent vent system is equipped with high efficiency particulate airand charcoal filters (LES, 2004a).

The results of the consequence assessment are presented in Table C-15. Industry experience with this type of criticality accident indicates that a worker located in the immediate vicinity of the reaction is not likely survive the accident. However, with increasing distance from the accident, the radiation doses would be lower, and the probability that a worker could survive increases. At the proposed NEF, workers would have direct access to vessels and other process equipment in which criticality events would be possible. Therefore, the accident has been qualitatively evaluated as a high consequence event for the worker.

The environmental consequence is evaluated using the sum-of-the-fractions rule. The concentration at the restricted area boundary of each fission product radionuclide generated during a hypothetical uranium solution criticality event (NRC, 1998b) is compared to 5,000 times the corresponding values in Appendix B to 10 CFR Part 20. The fractions thus generated (i.e., calculated fission product concentrations divided by their Appendix B limits) are added to yield one value. If that value is less than 1, the accident

consequences to the environment are low. Since the sum presented in Table C-14 is less than 1, the postulated criticality event is estimated to be a low consequence to the environment.

Table C-15 Health Effects Resulting from Inadvertent Nuclear Criticality

Worker (egress after 5 min.)	Environment at RAB (Ratio)	Individual at CAB, SW Direction	Collective Dose, West Direction	
			person-rem	LCFs
High	0.66[a]	0.14 rem[b] (.0014 Sv)	44	0.03

[a] Pursuant to 10 CFR § 70.61(c)(3), this value is the sum of the fractions of individual fission product radionuclide concentrations over 5,000 times the concentration limits that appear in 10 CFR Part 20, Appendix B, Table 2.
[b] The dose to the individual at the controlled area boundary is the sum of internal and external doses from fission products released from the Technical Service Buildings Gaseous Effluent Vent System stack.
RAB - restricted area boundary.
CAB - controlled area boundary.
LCF - latent cancer fatalities.
Sv - sievert.
To convert rem to sievert, multiply by 0.01.

A maximally exposed individual at the controlled area boundary in the southwest direction would receive a TEDE of 0.14 rem (.0014 sievert). This is a low consequence to this individual. Similarly, the low collective dose to the offsite population in the west sector (Eunice) means that the risk of health effects to the offsite public (latent cancer) from this accident is low. The west sector would have the highest radiation doses following a criticality accident, because the city of Eunice, New Mexico, lies in closer proximity to the proposed NEF than other population centers, and short-lived radionuclides formed during the criticality accident would not have completely decayed before reaching Eunice. Larger population centers in the north sector, such as the city of Hobbs, New Mexico, would receive lower collective doses because the short-lived fission products would decay during the time the plume travels from the proposed NEF.

In accordance with the performance requirements of 10 CFR Part 70, Subpart H, LES has identified Items Relied on for Safety to reduce the risk to the proposed NEF worker from all criticality accidents. These controls include passive engineered controls (e.g., safe geometry equipment that prevents the configuration of a critical mass), active controls (e.g., safe storage arrays for bottles and containers), and administrative controls (e.g., procedures to limit the mass of special nuclear material or to exclude the presence of moderators). For the postulated event in the citric acid tank, LES proposes to use administrative controls for mass control in the tank including tank sampling, visual inspection of the tank, safety margins for double batching, and operator training.

C.4.2.2 Hydraulic Rupture of a UF_6 Cylinder in the Blending and Liquid Sampling Area

At the Product Blending System in the Blending and Liquid Sampling Area of the Separations Building, Type 30B (2.5-ton [2.3-metric ton]) cylinders would be filled with product to customer specifications. The transfer of product to Type 30B cylinders would begin by heating a 14-ton (13-metric ton) Type 48Y cylinder containing product UF_6 inside a Blending Donor Station to no more than 61°C (142°F). The heated UF_6 gas would be transferred by piping from the heated Type 48Y cylinder to a Blending Receiver Station containing a Type 30B cylinder. The Blending Receiver Station would be cooled,

which would allow the UF_6 gas to desublime to a solid inside the Type 30B cylinder, completing the transfer.

An accident is postulated wherein the Blending Donor Station heater controller fails, causing the blending donor heater within the station to remain on. Were this to occur, the product cylinder could overheat and the cylinder could hydraulically rupture due to the expansion of the liquid UF_6. Upon cylinder rupture, the entire contents of the Type 48Y product cylinder (12,500 kilograms [27,560 pounds] of UF_6) would be released within the Blending Donor Station. Since the station enclosure is not airtight, the UF_6 would be released to the Blending and Liquid Sampling Area. The UF_6, when in contact with air, would produce hydrogen fluoride gas and UO_2F_2. The release into the building would then be released to the environment. The heating, ventilation, and air-conditioning is conservatively assumed to be operating at the maximum ventilation flow rate. Significant quantities of hydrogen fluoride and UO_2F_2 would be carried by the prevailing wind beyond the controlled area boundary.

The results of the consequence assessment are presented in Table C-16 and show the health and environmental consequences of this accident would be high.

Table C-16 Health Effects Resulting from Hydraulic Rupture of a UF_6 Cylinder

Worker (egress after 5 minutes)		**Environment at RAB**	**Individual at CAB, SW Direction**		**Collective Dose, North Direction**	
U intake, mg	[HF], $mg\text{-}m^{-3}$	mg $U\text{-}m^{-3}$	U intake, mg	[HF], $mg\text{-}m^{-3}$	person-rem	LCFs
High		44	150 (0.97 rem)	86	12,000	7

RAB - restricted area boundary.
CAB -controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meters.
To convert rem to sievert, multiply by 0.01.

A worker in the vicinity of the Blending Donor Station would be exposed within seconds to lethal UF_6, UO_2F_2, and hydrogen fluoride concentrations. The environmental consequences are higher than the 5.4 milligrams uranium per cubic meter threshold for an intermediate consequence. An individual located on the controlled area boundary in the southwest sector would suffer high consequences from both uranium and hydrogen fluoride exposure. The collective dose to the offsite population in the north sector indicates a risk of several LCFs in the population in the years following the accident.

In accordance with the performance requirements of 10 CFR Part 70, Subpart H, LES has identified Items Relied on for Safety to reduce the risk to the proposed NEF workers, the public, and the environment from the effects of this accident. To prevent this accident, LES would rely on fail-safe, hard-wired, high-temperature heater trips and redundant, independent, fail-safe, capillary high temperature heater trips. Each control would be tested annually to ensure its availability and reliability to serve its intended safety function on demand. The purpose of these controls would be to ensure that the

accident is highly unlikely to occur. In addition, there have been no similar heater control failures at the Urenco facilities in Europe in over 30 years of operation.

In addition to Items Relied on for Safety, LES has committed to an Emergency Plan that includes certain mitigating actions to reduce the consequences of the event. For example, in response to an alarm that indicates the release of UF_6, a control-room operator could secure the heating, ventilation, and air conditioning systems for the affected area. The action to secure the heating, ventilation, and air-conditioning within minutes of the accident would considerably reduce the risk to the public and the environment.

C.4.2.3 Natural Phenomena Hazard—Earthquake

An earthquake is postulated to breach all UF_6 piping systems and lead to a release of approximately 860 kilograms (1,896 pounds) of UF_6 (LES, 2004a). This accident was evaluated for the Blending and Liquid Sampling Area, UF_6 Handling Areas, and the Cascade Halls. LES has committed to ensure the affected process buildings can withstand the design-basis earthquake. Therefore, for this evaluation, it is assumed that the buildings would remain intact. LES would also install and maintain an electrical trip system for select heating, ventilation, and air-conditioning systems in process areas with large inventories of gaseous UF_6. The trip system would detect earthquakes and secure the heating, ventilation, and air-conditioning units. Therefore, for this evaluation, it is also assumed that the heating, ventilation, and air-conditioning in affected process buildings is shut down.

The results of the consequence assessment are presented in Table C-17 for a worker located in one of the Cascade Halls during the earthquake. Depending on the location of the worker when the event occurs, the large quantity of UF_6 which could be released would result in a high consequence to this individual before he or she could escape the room. The consequences to the environment would be low. The maximally exposed individual at the controlled area boundary in the southwest direction would not be expected to suffer any observable health effects. Similarly, the low collective dose to the offsite population in the north sector means that the risk of health effects to the offsite public (latent cancer) from this accident would be low.

Table C-17 Health Effects Resulting from an Earthquake

Worker (egress after 5 minutes)		**Environment at RAB**	**Individual at CAB, SW Direction**		**Collective Dose, North Direction**	
U intake, mg	[HF], mg-m^{-3}	mg U-m^{-3}	U intake, mg	[HF], mg-m^{-3}	person-rem	LCFs
High		0.11	0.39 (0.00099 rem)	0.13	14	0.008

RAB - restricted area boundary.
CAB - controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meter.
To convert rem to sievert, multiply by 0.01.

C.4.2.4 Fire in a UF_6 Handling Area

A fire involving transient combustible material is postulated to breach a UF_6 transfer manifold containing feed vapor from five feed stations in a single UF_6 Handling Area. The release would involve approximately 3.4 kilograms (7.5 pounds) of UF_6 vapor.

The results of the consequence assessment are presented in Table C-18 and show that the consequences of this accident are low for the proposed NEF worker, the environment, the individual at the controlled area boundary, and the public offsite.

Table C-18 Health Effects Resulting from Fire in a UF_6 Handling Area[a]

Worker (egress after 5 minutes)		Environment at RAB	Individual at CAB, SW Direction		Collective Dose, North Direction	
U intake, mg	[HF], $mg\text{-}m^{-3}$	mg $U\text{-}m^{-3}$	U intake, mg	[HF], $mg\text{-}m^{-3}$	person-rem	LCFs
3.2 (0.0055 rem)	11	0.012	0.042 (0.000072 rem)	0.024	0.92	0.0006

RAB - restricted area boundary.
CAB - controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meter.
To convert rem to sievert, multiply by 0.01.

In accordance with the performance requirements of 10 CFR Part 70, Subpart H, LES has identified Items Relied on for Safety to ensure the risk of this type of accident remains low. To reduce the magnitude of fires resulting from the presence of transient combustible material, LES would rely on administrative controls. The purpose of these controls is to prevent large fires that could result in the release of large inventories of UF_6.

C.4.2.5 Process Line Rupture in a Product Low-Temperature Takeoff Station

Cold traps and chemical traps would be used at the proposed NEF to remove residual UF_6 and hydrogen fluoride from process lines prior to discharging exhaust gases from these lines to the gaseous effluent vent system. An accident could occur if a product vent subsystem carbon trap became saturated with UF_6 caused by a small UF_6 leak through a product cold trap valve. Were this to occur, a UF_6 plug could form on the discharge of the vacuum pump, causing high pressure in the vacuum pump and thus failing seals leading to a release of approximately 1.0 kilogram (2 pounds) of UF_6 vapor to the UF_6 Handling Area.

The results of the consequence assessment are presented in Table C-19 and show that the consequences of this accident are low for the proposed NEF worker, the environment, the individual at the controlled area boundary, and the public offsite.

Table C-19 Acute Health Effects Resulting from Process Line Rupture in a Product Low-Temperature Takeoff Station

Worker (egress after 5 minutes)		Environment at RAB	Individual at CAB, SW Direction		Collective Dose, NNW Direction	
U intake, mg	[HF], $mg\text{-}m^{-3}$	mg $U\text{-}m^{-3}$	U intake, mg	[HF], $mg\text{-}m^{-3}$	person-rem	LCFs
0.92 (0.0059 rem)	3.1	0.0035	0.012 (0.000078 rem)	0.0069	0.97	0.0006

RAB - restricted area boundary.
CAB - controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meter.
To convert rem to sievert, multiply by 0.01.

In accordance with the performance requirements of 10 CFR Part 70, Subpart H, LES has identified Items Relied on for Safety to ensure the risk of this type of accident remains low. For this accident, a preventive measure is a fail-safe, hard-wired, high-carbon trap weight trip of the vacuum pump. This equipment would be tested annually to ensure its availability and reliability to serve its intended safety function.

C.4.3 Consequence Assessment for Land and Biota Effects

The hydraulic rupture of a UF_6 cylinder is used to demonstrate the potential impacts that an accident at the proposed NEF would have on the surrounding land and biota. This accident releases the maximum quantity of UF_6 and thus bounds the impacts of all of the accidents described in this appendix.

As described in Section C.4.2, the postulated rupture could release up to 12,500 kilograms (27,600 pounds) of UF_6 into the Blending Donor Station and then to the Sampling Area. The release into the building would then be released into the atmosphere. The consequences of such a release on the surrounding land and biota are considered by analogy with the consequences from a similar accident that occurred at the Sequoyah Fuels Corporation in January 1986 (NRC, 1986). A rupture of a cylinder containing 13,380 kilograms (29,500 pounds) was caused by a supervisor taking actions contrary to operating procedures. The rupture resulted in the release of UF_6 outside of the building. The release formed a cloud consisting of the chemical products of UF_6 reacting with the moisture in the air, UO_2F_2 and hydrogen fluoride. It was estimated that 75 percent of the release occurred over 5 minutes with the remaining 25 percent of the release occurring over the subsequent 40 minutes. The plume was transported along with the wind which was blowing at 8 meters per second (18 miles per hour) with atmospheric stability class D.

Areas over which the release products from this accident at Sequoyah Fuels Corporation were deposited were estimated in NUREG-1189 (NRC, 1986). Uranium deposition of 13,600 milligrams per square meter (0.045 ounces per square foot) was found onsite while an area of 7.68 square kilometers (2.97 square miles) was found to encompass uranium depositions of 1.36 milligrams per square meter (4.5×10^{-6} ounces per square foot). Soil concentration action levels of 40 micrograms per gram for uranium and 350 micrograms per gram for fluoride were established based on health considerations.

Deposition rates were converted to soil concentration by assuming that the deposited material mixes with the upper centimeter (inch) of soil having a typical density of 2 grams per cubic centimeter (about 125 pounds per cubic foot). Uranium soil concentrations were then found to exceed the action level within an area of approximately 0.32 square kilometers (0.20 square miles). This area extended approximately 1 kilometer (0.6 miles) from the release location. The fluoride soil concentration action level was found to not extend offsite.

Cattle located onsite were examined by veterinarians and showed no ill effects from the release. Their urine samples did indicate elevated levels of fluoride and uranium. Animals on farms beyond Sequoyah Fuels Corporation were considered free to move to slaughter in the normal manner. The highest levels of uranium and fluoride were contained onsite. The effects on vegetation of the lower levels found offsite were expected to be insignificant.

These effects at Sequoyah Fuels Corporation are expected to be somewhat greater than the effects that would result if a similar (bounding) accident were to occur at the proposed NEF. The quantity of UF_6 subject to release at the proposed NEF would be approximately 93 percent of that at Sequoyah Fuels Corporation. The release rates from the proposed NEF would be less than those at Sequoyah Fuels Corporation because the former release would be from building ventilation rather than directly outside. At the proposed NEF, somewhat less than half of the released material would enter the environment outside of the building in the first 30 minutes after the rupture. This lower release rate to the environment would result in lower environmental concentrations in the site vicinity. Winds at the proposed NEF could be expected to result in at least as much dispersion as the winds at Sequoyah Fuels Corporation did during the accident. The wind speed at the proposed NEF would be greater than 7 meters per second (15.7 miles per hour) 72.2 percent of the time (see Section 3.5.2.4, Winds and Atmospheric Stability, of this Draft EIS); the atmospheric stability would be class D or less stable 65.8 percent of the time. Lesser wind speeds or more stable atmospheric conditions would result in less dispersion and elevated soil concentrations extending further, although not spreading as much laterally.

C.4.4 Accident Analysis Summary

A representative subset of the potential accidents that could occur at the proposed NEF was selected and evaluated with the summary of the five potential accidents given in Table C-20. The accident consequences vary in magnitude and include accidents initiated by natural phenomena, operator error, and equipment failure. Analytical results indicate that accidents at the proposed NEF pose acceptably low risks. The most significant accident consequences are those associated with the release of UF_6 caused by rupturing an overfilled and/or overheated cylinder. The proposed NEF design would reduce the risk (likelihood) of this event by using redundant heater controller trips. In addition, the proposed NEF Emergency Plan addresses this type of event and all other lower-risk, high-consequence, and intermediate-consequence events. It is concluded that through the combination of plant design, passive and active engineered controls (Items Relied on for Safety), and administrative controls, accidents at the proposed NEF would pose an acceptably low risk to workers, the environment, and the public.

Table C-20 Summary of Health Effects Resulting from Accidents at the Proposed NEF

Accident	Worker[a] U intake, mg (rem)	Worker[a] [HF], mg/m^3	Environment at RAB $mg\ U/m^3$	Individual at CAB, SW Direction U intake mg (rem)	Individual at CAB, SW Direction [HF], mg/m^3	Collective Dose Direction	Collective Dose person-rem	Collective Dose LCFs
Inadvertent Nuclear Criticality	High[b]		0.66[c]	(0.14[d])	---	West	44	0.03
Hydraulic Rupture of a UF_6 Cylinder	High[b]		44	150 (0.97)	86	North	12,000	7[e]
Earthquake	High[b]		0.11	0.39 (0.00099)	0.13	North	19	0.008
Fire in a UF_6 Handling Area	3.2 (0.0055)	11	0.012	0.042 (0.000072)	0.024	North	0.92	0.0006
Process Line Rupture	0.92 (0.0059)	3.1	0.0035	0.012 (0.000078)	0.0069	North	0.97	0.0006

[a] Worker exits after 5 minutes.
[b] High consequence could lead to a fatality.
[c] Pursuant to 10 CFR § 70.61(c)(3), this value is the sum of the fractions of individual fission product radionuclide concentrations over 5,000 times the concentration limits that appear in 10 CFR Part 20, Appendix B, Table 2.
[d] The dose to the individual at the controlled area boundary is the sum of internal and external doses from fission products released from the Technical Services Buildings Gaseous Effluent Vent System stack.
[e] Though the consequences of the rupture of a liquid-filled UF_6 cylinder would be high, redundant heater controller trips would make this event highly unlikely.
RAB - restricted area boundary.
CAB - controlled area boundary.
HF - hydrogen fluoride.
LCF - latent cancer fatalities.
mg - milligram.
m^3 - cubic meter.
To convert rem to sievert, multiply by 0.01.

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APPENDIX D - TRANSPORTATION METHODOLOGY, ASSUMPTION, AND IMPACTS

D.1 Introduction

This appendix presents the methodology, assumptions, and results for the transportation of radioactive materials to and from the proposed National Enrichment Facility (NEF). Also included is the transportation of the converted triuranium octaoxide (U_3O_8) and calcium fluoride (CaF_2) (if necessary) resulting from the conversion of the depleted uranium hexafluoride (DUF_6). The CaF_2 is generated during the conversion process from the neutralization of hydrofluoric acid. However, if the conversion process is performed at a potential facility at Metropolis, Illinois, the hydrogen fluoride acid would be reused at that facility. Louisiana Energy Services (LES) has proposed to use only trucks for the transport of radioactive shipments; however, this appendix also assumes that rail transport would be a viable option.

Briefly, the impact assessment needs to determine the following: the origin and destination of each type of radioactive material, the amount of material in each shipment, the mode of shipment (truck or rail), the route to be used, and finally the impact assessment. In this process, the WebTragis and RADTRAN 5 computer codes were used extensively and are discussed in more detail later (ORNL, 2003; Neuhauser and Kanipe, 2003). The appendix is organized into separate sections that describe the radioactive materials, the shipping routes, the dose assessments, and the results.

D.2 Radioactive Material Description

The radioactive materials transported to and from the proposed NEF are subject to both NRC (10 CFR Part 71) and DOT (49 CFR Parts 171-173) shipping regulations. With the exception of the product material, all shipments can be transported in Type A shipping containers without additional requirements. The product material can be shipped in Type A containers but is considered as fissile material and would require additional fissile controls. An overpack surrounding the shipping container would be required. However, in this assessment of the radiological impacts, any reduction in exposures due to the present of an overpack is ignored.

Several different types of radioactive materials are proposed for shipment. Table D-1 presents the composition of three different types of containers proposed for the shipment of feed, product, depleted uranium, and waste. Figures D-1 through D-3 are diagrams and Tables D-2 through D-4 are the specifications for the Type 30B, 48X, and 48Y cylinders, respectively. One year of decay was included as a conservative assumption to account for a decay in shipping between the generation of the natural UF_6 and any radioactive shipments.

Two other radioactive materials requiring transportation that result from the conversion of DUF_6 are depleted U_3O_8 and CaF_2. Assuming no change in isotopic concentration of the four uranium isotopes, the U_3O_8 material would have the same curie content as the DUF_6. The CaF_2 could have about 55 becquerels (1.5 picocuries) per gram of depleted uranium as a radioactive contaminate (DOE, 2004a; DOE 2004b). Based on a 11,340-kilogram (25,000-pound) amount of processed material, Table D-5 presents the curie inventory of the converted U_3O_8 and CaF_2. This amount of material presents the approximate net load that a truck could reasonably haul without obtaining special permits.

The radionuclide data and shipping container characteristics for input into RADTRAN 5 were obtained from the U.S. Department of Energy's (DOE's) *A Resource Handbook on DOE Transportation Risk*

Assessment (DOE, 2002) and the U.S. Nuclear Regulatory Commission's (NRC's) NUREG-0170 (NRC, 1977).

Table D-1 Curie Inventory in Selected Shipping Containers for Truck Transportation[a]

Radionuclide	Feed Material (Natural Uranium as UF_6)		Product (Enriched Uranium as UF_6)	Depleted Uranium (DUF_6)	Residue (Heels)	Solid Waste
	Type 48Y Cylinder	Type 48X Cylinder	Type 30B Cylinder	Type 48Y Cylinder	Type 48Y Cylinder	55-Gallon Drum
Tl-207	4.28×10^{-8}	3.29×10^{-8}	5.74×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.84×10^{-12}
Tl-208	1.75×10^{-15}	1.35×10^{-15}	2.35×10^{-15}	8.35×10^{-16}	1.25×10^{-15}	2.80×10^{-19}
Pb-210	5.52×10^{-11}	4.25×10^{-11}	8.71×10^{-11}	2.48×10^{-11}	4.49×10^{-11}	8.82×10^{-15}
Pb-211	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Pb-212	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Pb-214	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.72×10^{-13}
Bi-210	5.52×10^{-11}	4.25×10^{-11}	8.71×10^{-11}	2.48×10^{-11}	4.38×10^{-11}	8.82×10^{-15}
Bi-211	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Bi-212	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Bi-214	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.72×10^{-13}
Po-210	1.79×10^{-11}	1.38×10^{-11}	2.82×10^{-11}	8.04×10^{-12}	2.32×10^{-11}	2.86×10^{-15}
Po-211	1.20×10^{-10}	9.25×10^{-11}	1.61×10^{-10}	5.75×10^{-11}	3.90×10^{-11}	1.92×10^{-14}
Po-212	3.12×10^{-15}	2.40×10^{-15}	4.18×10^{-15}	1.49×10^{-15}	2.22×10^{-15}	4.99×10^{-19}
Po-214	5.45×10^{-9}	4.20×10^{-9}	8.60×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.71×10^{-13}
Po-215	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Po-216	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Po-218	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.72×10^{-13}
Rn-219	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Rn-220	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Rn-222	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.91×10^{-9}	8.72×10^{-13}
Fr-223	5.92×10^{-10}	4.56×10^{-10}	7.94×10^{-10}	2.83×10^{-10}	2.09×10^{-10}	9.47×10^{-14}
Ra-223	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.39×10^{-8}	6.86×10^{-12}
Ra-224	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.47×10^{-15}	7.79×10^{-19}
Ra-226	5.45×10^{-9}	4.20×10^{-9}	8.61×10^{-9}	2.45×10^{-9}	1.93×10^{-9}	8.72×10^{-13}
Ra-228	4.37×10^{-14}	3.37×10^{-14}	5.86×10^{-14}	2.09×10^{-14}	1.48×10^{-14}	6.99×10^{-18}
Ac-227	4.29×10^{-8}	3.30×10^{-8}	5.75×10^{-8}	2.05×10^{-8}	1.51×10^{-8}	6.86×10^{-12}
Ac-228	4.37×10^{-14}	3.37×10^{-14}	5.86×10^{-14}	2.09×10^{-14}	1.48×10^{-14}	6.99×10^{-18}

Radionuclide	Feed Material (Natural Uranium as UF_6)		Product (Enriched Uranium as UF_6)	Depleted Uranium (DUF_6)	Residue (Heels)	Solid Waste
	Type 48Y Cylinder	Type 48X Cylinder	Type 30B Cylinder	Type 48Y Cylinder	Type 48Y Cylinder	55-Gallon Drum
Th-227	4.23×10^{-8}	3.26×10^{-8}	5.67×10^{-8}	2.02×10^{-8}	1.42×10^{-8}	6.77×10^{-12}
Th-228	4.87×10^{-15}	3.75×10^{-15}	6.53×10^{-15}	2.32×10^{-15}	3.53×10^{-15}	7.79×10^{-19}
Th-230	2.52×10^{-5}	1.94×10^{-5}	3.97×10^{-5}	1.13×10^{-5}	3.01×10^{-6}	4.03×10^{-9}
Th-231	1.29×10^{-1}	9.91×10^{-2}	1.73×10^{-1}	6.16×10^{-2}	0	2.06×10^{-5}
Th-232	8.74×10^{-13}	6.73×10^{-13}	1.17×10^{-12}	4.17×10^{-13}	1.04×10^{-13}	1.40×10^{-16}
Th-234	2.8	2.15	5.10×10^{-1}	2.81	1.06×10^{-5}	4.47×10^{-4}
Pa-231	2.72×10^{-6}	2.10×10^{-6}	3.65×10^{-6}	1.30×10^{-6}	3.28×10^{-7}	4.36×10^{-10}
Pa-234m	2.8	2.15	5.10×10^{-1}	2.81	1.06×10^{-5}	4.47×10^{-4}
Pa-234	3.64×10^{-3}	2.80×10^{-3}	6.63×10^{-4}	3.65×10^{-3}	1.38×10^{-8}	5.82×10^{-7}
U-234	2.8	2.15	4.42	1.26	9.01×10^{-8}	4.47×10^{-4}
U-235	1.29×10^{-1}	9.91×10^{-2}	1.73×10^{-1}	6.16×10^{-2}	0	2.06×10^{-5}
U-236	1.77×10^{-2}	1.36×10^{-2}	2.38×10^{-2}	8.46×10^{-3}	0	2.83×10^{-6}
U-238	2.8	2.15	5.10×10^{-1}	2.81	0	4.47×10^{-4}

[a] Includes 1-year decay and in-growth.
To convert from curies to becquerels multiply by 3.7×10^{10}
Source: LES, 2004b.

Table D-2 Type 30B Cylinder Specifications

Parameter	Value
Nominal Diameter	76 centimeters (30 inches)
Nominal Length	206 centimeters (81 inches)
Wall Thickness	1.27 centimeters (0.5 inch)
Nominal Tare Weight	635 kilograms (1,400 pounds)
Maximum Net Weight	2,300 kilograms (5,000 pounds)
Nominal Gross Weight	2,900 kilograms (6,400 pounds)
Minimum Volume	736 liters (26 cubic feet)
Basic Material of Construction	Steel: ASTM A-516
Service Pressure	1,380 kiloPascals gage (200 pounds per square inch gage)
Hydrostatic Test Pressure	2,760 kiloPascals gage (400 pounds per square inch gage)
Isotopic Content Limit	5.0 percent uranium-235 (^{235}U) (maximum with moderation control)
Valve Used	2.54-centimeter valve (1-inch valve)

Source: USEC, 1995.

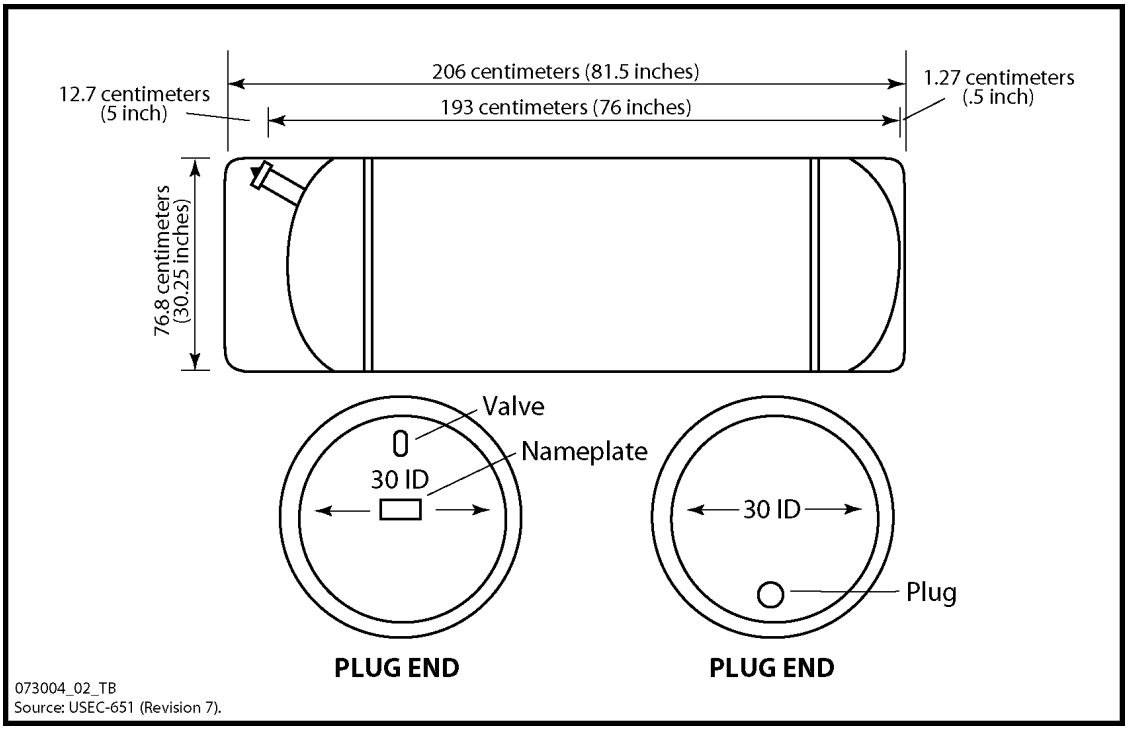

Figure D-1 Schematic of a Type 30B Cylinder (USEC, 1995)

Table D-3 Type 48X Cylinder Specifications

Parameter	Value
Nominal Diameter	122 centimeters (48 inches)
Nominal Length	302 centimeters (119 inches)
Wall Thickness	1.6 centimeters (0.625 inch)
Nominal Tare Weight	2,000 kilograms (4,500 pounds)
Maximum Net Weight	9,540 kilograms (21,000 pounds)
Nominal Gross Weight	11,600 kilograms (25,500 pounds)
Minimum Volume	3.048 cubic meters (108.9 cubic feet)
Basic Material of Construction	Steel: ASTM A-516
Service Pressure	1,380 kiloPascals gage (200 pounds per square inch gage)
Hydrostatic Test Pressure	2,760 kiloPascals gage (400 pounds per square inch gage)
Isotopic Content Limit	4.5 percent ^{235}U (maximum with moderation control for transport, 5.0% for in-plant use)
Valve Used	2.54-centimeter valve (1-inch valve)

Source: USEC, 1995.

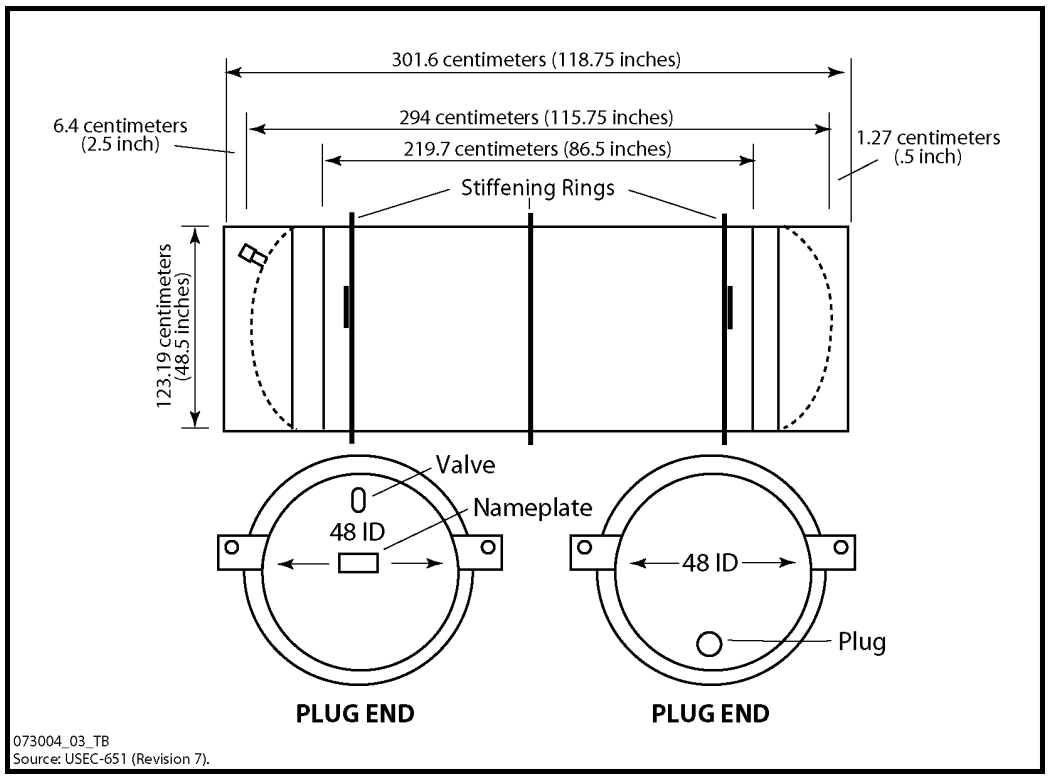

Figure D-2 Schematic of a Type 48X Cylinder (USEC, 1995)

Table D-4 Type 48Y Cylinder Specifications

Parameter	Value
Nominal Diameter	122 centimeters (48 inches)
Nominal Length	380 centimeters (150 inches)
Wall Thickness	1.6 centimeters (0.625 inches)
Nominal Tare Weight	2,359 kilograms (5,200 pounds)
Maximum Net Weight	12,500 kilograms (27,560 pounds)
Nominal Gross Weight	14,860 kilograms (32,760 pounds)
Minimum Volume	4.04 cubic meters (142.7 cubic feet)
Basic Material of Construction	Steel: ASTM A-516
Service Pressure	1,380 kiloPascals gage (200 pounds per square inch gage)
Hydrostatic Test Pressure	2,760 kiloPascals gage (400 pounds per square inch gage)
Isotopic Content Limit	4.5 percent ^{235}U (maximum with moderation control)
Valve Used	2.54-centimeter valve (1-inch valve)

Source: USEC, 1995.

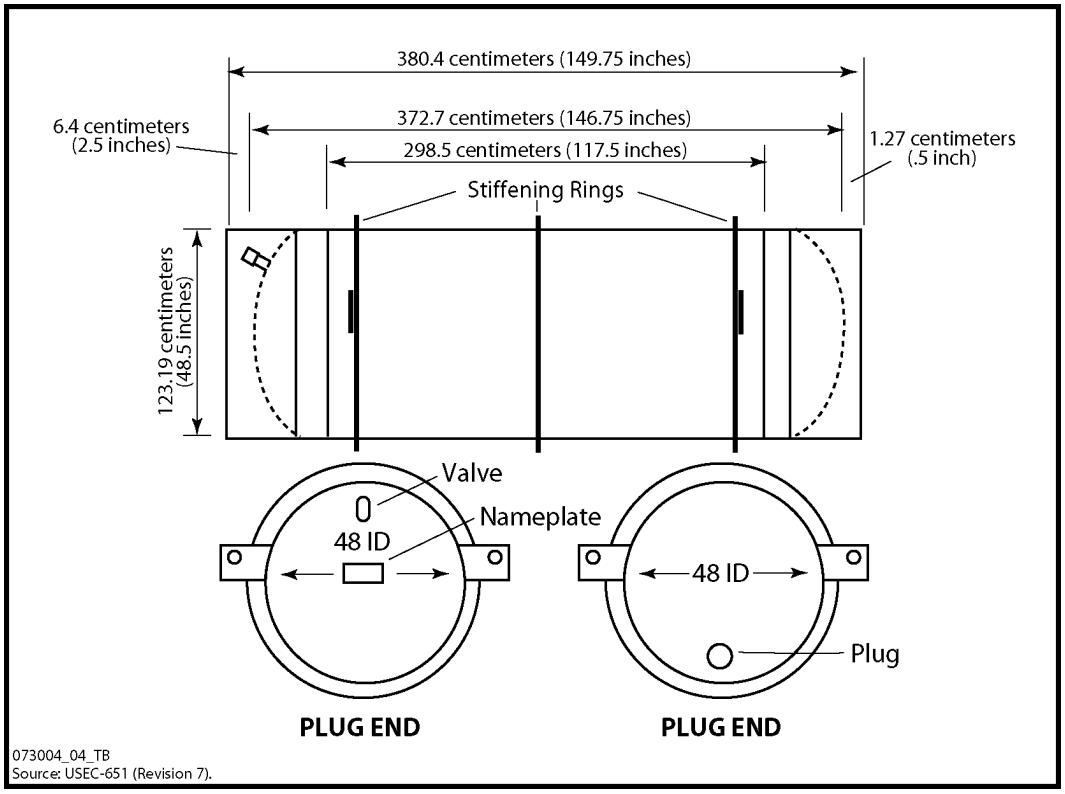

Figure D-3 Schematic of a Type 48Y Cylinder (USEC, 1995)

Table D-5 Curie Content of U_3O_8 and CaF_2 Based on 11,340-Kilogram (25,000-Pound) Amounts

	Curie Content	
Radionuclide	**U_3O_8 [a, b]**	**CaF_2 [a, c]**
Uranium-234	4.47	1.70×10^{-5}
Uranium-235	0.218	5.82×10^{-9}
Uranium-236	0.03	1.72×10^{-7}
Uranium-238	9.94	9.05×10^{-10}

[a] Based on the DUF_6 radionuclide concentration.
[b] Based on a material conversion of 1.18 pounds of U_3O_8 per pound of uranium in UF_6.
[c] Based on the material conversion of 2.05 pound of CaF_2 per pound of F in UF_6 and 1.5 picocurie contamination of depleted uranium per gram of CaF_2.
To convert from curies to becquerels, multiply by 3.7×10^{10}.

The NRC staff reviewed the number of shipments and the number of packages per truck based on the amount of materials being shipped to or from the proposed NEF. The NRC staff assumed that the contents of a railcar have the equivalent content of four trucks. Table D-6 presents the number of packages and number of trucks or railcars that would be required for the transport.

Table D-6 Number of Packages and Number of Trucks or Railcars Required for the Transport

Material	Type of Container	Number of		
		Containers	Trucks	Railcars
Natural UF_6	Type 48X[a]	890[a]	890[a]	223
	Type 48Y[a]	690[a]	690[a]	173
Enriched UF_6	Type 30B[a]	350[a]	117[a]	30
DUF_6	Type 48Y[a]	627[a]	627[a]	157
Depleted U_3O_8	11,340-kg (25,000-lb) bulk bags[b]	547	547	137
CaF_2	11,340-kg (25,000-lb) bulk bags[b]	461	461	116
Solid Waste	55 gallon drums[a]	480[a]	8[a]	2

kg - kilogram.; lb - pound.
Source: [a] LES, 2004a; [b] DOE, 2004a; DOE, 2004b.

Table D-7 provides a summary of information regarding estimates of the direct radiation near each type of shipping container (LES, 2004).

Table D-7 Direct Radiation Surrounding Shipping Containers

Item	Feed Material in Type 48X Cylinder	Feed Material in Type 48Y Cylinder	Product in Type 30B Cylinder	DUF_6 in Type 48Y Cylinder	Solid Waste in 55-gallon drum
Direct Radiation at 1 meter (mrem/hr)	0.29	0.29	0.19	0.28	0.0042
Direct Radiation at 2 meters (mrem/hr)	0.0722	0.0722	0.032	0.072	0.0013

mrem/hr - millirems per hour.
To convert from millirems to millisieverts, multiply by 1×10^{-2}
Source: LES, 2004b.

The direct radiation from the DUF_6 cylinder was assumed to be representative of the direct radiation from the shipments of U_3O_8 and CaF_2 via truck. The U_3O_8 and CaF_2 were assumed to be shipped in bulk bags on a truck in 11,340-kilogram (25,000-pound) amounts.

For shipments by railroad, a railcar could transport four times the amount that is proposed to be transported by truck. The direct radiation per cylinder was assumed to remain the same.

In addition to the radioactive materials released from containers of UF_6 (either natural, enriched, or depleted) during an accident, toxic chemicals could be released, as discussed in Section D.5. The impacts are also discussed in Section D.5.

D.3 Transportation Routes

This section presents the various shipping routes for the radioactive material to and from the sites and from the U_3O_8 conversion facility. WebTragis (ORNL, 2003) was used to generate the routing information for both the truck and railroad routes. WebTragis is a web-based version of Tragis (Transport Routing Analysis Geographic Information System) and is used to calculate highway, rail, or waterway routes within the United States. Table D-8 presents a matrix of the shipping origins and destinations for the various radioactive materials.

Table D-8 Shipping Origins and Destinations

Route	Feed Material (Natural UF_6)	Product (Enriched UF_6)	DUF_6	Depleted U_3O_8	CaF_2	Solid Waste
Port Hope, ON, to NEF [a]	X					
Metropolis, IL, to NEF [a]	X					
NEF to Columbia, SC [a]		X				
NEF to Wilmington, NC [a]		X				
NEF to Richland, WA [a]		X				
NEF to Paducah, KY			X			
NEF to Portsmouth, OH			X			
NEF to Metropolis, IL [a]			X			
NEF to Clive, UT [a]				X[b]	X[b]	X
NEF to Hanford, WA [a]				X[b]	X[b]	X
NEF to Barnwell, SC [a]						X
NEF to Oak Ridge, TN [a]						X
Metropolis, IL, to Clive, UT				X		
Paducah, KY, to Clive, UT				X		
Portsmouth, OH, to Clive, UT				X		
Paducah, KY, to NTS, NV				X		
Portsmouth, OH, to NTS, NV				X		

[a] LES, 2004a.

ON - Ontario, Canada. NEF - proposed NEF. IL - Illinois. SC - South Carolina.
NC - North Carolina. WA - Washington. KY - Kentucky. OH - Ohio.
UT - Utah. TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

[b] As discussed in Section2.1.9, Option 1b, it was assumed that the conversion facility could be located within 6.4 kilometers (4.0 miles) of the proposed NEF).

For this Draft Environmental Impact Statement (Draft EIS), both truck and rail shipments were assumed to be valid modes of transport for each route. For some routes, the destination is not directly served by rail and it is assumed that the radioactive materials would be transferred to truck for delivery to the final destination. WebTragis generates routing distance, population density within 800 meters (0.5 mile), and for the truck routes, the number of rest stops and stops for State inspections. Tables D-9 and D-10 present the output from WebTragis to be used in the transportation assessment for truck and rail transport, respectively. For Port Hope, Ontario, an additional 241 kilometers (150 miles) of route distance and an inspection stop was added to the WebTragis output to account for that portion of the route located in Canada.

Even though transportation regulations by truck do not require restricted routing for the shipment of natural uranium, low-enriched uranium, or depleted uranium, routing restrictions were applied as follows:

- Highway Route Controlled Quantity preferred route with two drivers.
- Prohibit use of links prohibiting truck use.
- Prohibit use of ferry crossing; prohibit use of roads with hazardous materials prohibition.
- Prohibit use of roads with radioactive materials prohibition.

Table D-9 Distance, Density, and Stop Information Generated by WebTragis for Truck Routes

Facility	Number of Stops		Link Type	Distance Per Trip (km [mile])		Population Density (people/km^2 [mile^2])	
	Inspection	Rest					
UF_6 Conversion Facility, Port Hope, Ontario, Canada	7	9	Rural	2,026.6	(1,259.3)	15.5	(6.0)
			Suburban	1,053.0	(654.3)	333.1	(128.6)
			Urban	129.9	(80.7)	2,276.8	(879.1)
UF_6 Conversion Facility, Metropolis, IL	3	4	Rural	1,329.1	(825.9)	12.6	(4.9)
			Suburban	414.8	(257.7)	320.9	(123.9)
			Urban	44.0	(27.3)	2,255.3	(870.8)
Fuel Fabrication Facility, Columbia, SC	5	6	Rural	1,557.8	(968.0)	24.5	(9.5)
			Suburban	689.5	(428.4)	318.2	(122.9)
			Urban	65.8	(40.9)	2,193.6	(847.0)
Fuel Fabrication Facility, Wilmington, NC	6	7	Rural	1,850.5	(1,149.8)	14.8	(5.7)
			Suburban	836.3	(519.7)	309.1	(119.3)
			Urban	69.4	(43.1)	2,191.9	(846.3)
Fuel Fabrication Facility, Richland, WA	7	9	Rural	2,950.9	(1,833.6)	7.6	(2.9)
			Suburban	501.8	(311.8)	342.3	(132.2)
			Urban	85.2	(52.9)	2,318.5	(895.2)
Barnwell, SC	5	6	Rural	1,549.8	(963.0)	14.1	(5.4)
			Suburban	644.2	(400.3)	321.6	(124.2)
			Urban	65.8	(40.9)	2,170.6	(838.1)
Hanford, WA	7	9	Rural	2,986.4	(1,855.7)	7.6	(2.9)
			Suburban	501.2	(311.4)	342.5	(132.2)
			Urban	85.0	(52.8)	2,316.6	(894.4)

Facility	Number of Stops		Link Type	Distance Per Trip (km [mile])		Population Density (people/km^2 [mile^2])	
	Inspection	Rest					
Clive, UT	4	7	Rural	2,265.7	(1,407.8)	6.8	(2.6)
			Suburban	369.3	(229.5)	375.2	(144.9)
			Urban	84.5	(52.5)	2,359.3	(910.9)
Oak Ridge, TN	2	5	Rural	1,432.9	(890.4)	13.6	(5.3)
			Suburban	512.2	(318.3)	336.0	(129.7)
			Urban	69.7	(43.3)	2,264.6	(874.4)
DUF_6 Conversion Facility, Paducah, KY	4	5	Rural	1,348.0	(837.6)	12.6	(4.9)
			Suburban	418.4	(260.0)	319.2	(123.2)
			Urban	42.8	(26.6)	2,269.3	(876.2)
DUF_6 Conversion Facility, Portsmouth, OH	4	6	Rural	1,660.0	(1,031.5)	14.9	(5.8)
			Suburban	671.1	(417.0)	326.9	(126.2)
			Urban	78.8	(49.0)	2,249.1	(868.4)
Depleted U_3O_8 from Metropolis, IL, to Clive, UT	8	8	Rural	2,615.2	(1,625.0)	11.3	(4.4)
			Suburban	562.3	(349.4)	315.2	(121.7)
			Urban	69.1	(42.9)	2,293.8	(885.6)
Depleted U_3O_8 from Paducah, KY, to NTS, NV	8	8	Rural	2,731.3	(1,697.2)	9.9	(3.8)
			Suburban	532.2	(330.7)	328.0	(126.6)
			Urban	85.5	(53.1)	2,377.6	(918.0)
Depleted U_3O_8 from Portsmouth, OH, to NTS, NV	10	9	Rural	3,106.3	(1,930.2)	10.9	(4.2)
			Suburban	659.2	(409.6)	319.9	(123.5)
			Urban	99.4	(61.8)	2,396.6	(925.3)
Depleted U_3O_8 from Paducah, KY, to Clive, UT	6	7	Rural	2,240.2	(1,392.0)	10.1	(3.9)
			Suburban	435.3	(270.5)	323.8	(125.0)
			Urban	55.1	(34.2)	2,238.4	(864.3)
Depleted U_3O_8 from Portsmouth, OH, to Clive, UT	8	8	Rural	2,615.2	(1,625.0)	11.3	(4.4)
			Suburban	562.3	(349.4)	315.2	(121.7)
			Urban	69.1	(42.9)	2,293.8	(885.6)

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.
Source: Calculations using WebTragis (ORNL, 2003).

Table D-10 Distance, Density Information Generated by WebTragis for Rail Routes

Facility	Link Type	Distance Per Trip (km [mi])		Population Density (people/km^2 [mile^2])	
UF_6 Conversion Facility Port Hope, Ontario, Canada	Rural	2,361.0	(1,467.1)	11.3	(4.4)
	Suburban	769.3	(478.0)	436.3	(168.5)
	Urban	164.2	(102.0)	2,358.8	(910.7)
UF_6 Conversion Facility, Metropolis, IL	Rural	1,637.6	(1,017.6)	9.7	(3.7)
	Suburban	411.0	(255.4)	427.6	(165.1)
	Urban	56.4	(35.0)	2,148.4	(829.5)
Fuel Fabrication Facility, Columbia, SC	Rural	1,919.5	(1,192.7)	11.8	(4.6)
	Suburban	801.5	(498.0)	427.1	(164.9)
	Urban	122.1	(75.9)	2,169.1	(837.5)
Fuel Fabrication Facility, Wilmington, NC	Rural	2,150.7	(1,336.4)	12.0	(4.6)
	Suburban	878.0	(545.6)	424.0	(163.7)
	Urban	125.3	(77.9)	2,162.2	(834.8)
Fuel Fabrication Facility, Richland, WA	Rural	3,027.6	(1,881.3)	6.8	(2.6)
	Suburban	550.1	(341.8)	379.3	(146.4)
	Urban	168.2	(104.5)	2,567.5	(991.3)
Barnwell, SC	Rural	1,937.1	(1,203.7)	11.6	(4.5)
	Suburban	728.8	(452.9)	436.2	(168.4)
	Urban	129.5	(80.5)	2,210.2	(853.4)
Hanford, WA	Rural	3,035.5	(1,886.2)	6.8	(2.6)
	Suburban	554.1	(344.3)	380.5	(146.9)
	Urban	171.0	(106.3)	2,560.2	(988.5)
Clive, UT	Rural	2,668.2	(1,657.9)	5.4	(2.1)
	Suburban	327.1	(203.3)	362.9	(140.1)
	Urban	82.2	(51.1)	2,496.7	(964.0)
Oak Ridge, TN	Rural	1,734.2	(1,077.6)	11.4	4.4)
	Suburban	634.6	(394.3)	429.6	(165.9)
	Urban	97.5	(60.6)	2,158.5	(833.4)
DUF_6 Conversion Facility, Paducah, KY	Rural	1,441.2	(895.5)	10.2	(3.9)
	Suburban	425.4	(264.3)	440.0	(169.9)
	Urban	65.4	(40.6)	2,174.9	(839.7)
DUF_6 Conversion Facility, Portsmouth, OH	Rural	1,944.0	(1,207.9)	12.2	(4.7)
	Suburban	643.0	(399.5)	423.2	(163.4)
	Urban	117.7	(73.1)	2,269.2	(876.1)
Depleted U_3O_8 from Metropolis, IL, to Clive, UT	Rural	2,489.1	(1,546.7)	7.1	(2.7)
	Suburban	343.2	(213.3)	363.9	(140.5)
	Urban	54.2	(33.7)	2,309.7	(891.8)

Facility	Link Type	Distance Per Trip (km [mi])		Population Density (people/km^2 [mile^2])	
Depleted U_3O_8 from Paducah, KY, to NTS, NV	Rural	2,935.8	(1,842.2)	6.3	(2.4)
	Suburban	360.2	(223.8)	430.7	(166.3)
	Urban	76.3	(47.4)	2,196.4	(848.0)
Depleted U_3O_8 from Portsmouth, OH, to NTS, NV	Rural	3,191.9	(1,983.4)	7.8	(3.0)
	Suburban	494.3	(307.1)	365.1	(141.0)
	Urban	141.4	(87.9)	2,597.9	(1,003.1)
Depleted U_3O_8 from Paducah, KY, to Clive, UT	Rural	2,513.3	(1,561.7)	7.2	(2.8)
	Suburban	360.5	(224.0)	371.3	(143.4)
	Urban	56.3	(35.0)	2,293.0	(885.3)
Depleted U_3O_8 from Portsmouth, OH, to Clive, UT	Rural	2,669.1	(1,658.5)	8.4	(3.2)
	Suburban	503.0	(312.5)	392.1	(151.4)
	Urban	126.8	(78.8)	2,374.7	(916.9)

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.
km - kilometer; km^2 - square kilometer.
Source: Calculations using WebTragis (ORNL, 2003).

D.4 RADTRAN 5

The RADTRAN 5 computer code was used to estimate the impacts of the radioactive material shipments (Neuhauser and Kanipe, 2003). The potential impacts include health effects from the exposure to pollution from trucks or railroads, fatalities from truck or rail accidents, health effects from incident-free direct radiation to crew and surrounding populations along the transportation routes, and health effects from the release of radioactive material in transportation accidents. In addition to the WebTragis information, additional input parameters for RADTRAN 5 are required as discussed below.

D.4.1 Accident Parameters

The amount of radioactive material released from a transportation accident depends on the packaging of the material and the severity of the accident. A method widely used to characterize the potential severity of transportation accidents is described in NUREG-0170 (NRC, 1977) and is also presented in DOE's *A Resource Handbook on DOE Transportation Risk Assessment* (DOE, 2002). The NRC method divided the spectrum of accident severities into eight categories with each category being subdivided into rural, suburban, and urban zones containing the fraction of occurrence of the severity class within each zone. Table D-11 presents the fractional occurrences for accidents.

Table D-11 Fractional Occurrences for Accidents by Severity Category and Population Density Zone

Accident Severity Category	Fractional Occurrences of Severity Category	Fractional Occurrence by Population Zone		
		Low (Rural)	Medium (Suburban)	High (Urban)
Truck				
I	0.55	0.1	0.1	0.8
II	0.36	0.1	0.1	0.8
III	0.07	0.3	0.4	0.3
IV	0.016	0.3	0.4	0.3
V	0.0028	0.5	0.3	0.2
VI	0.0011	0.7	0.2	0.1
VII	8.50×10^{-5}	0.8	0.1	0.1
VIII	1.50×10^{-5}	0.9	0.05	0.05
Rail				
I	0.5	0.1	0.1	0.8
II	0.3	0.1	0.1	0.8
III	0.18	0.3	0.4	0.3
IV	0.018	0.3	0.4	0.3
V	0.0018	0.5	0.3	0.2
VI	1.30×10^{-4}	0.7	0.2	0.1
VII	6.00×10^{-5}	0.8	0.1	0.1
VIII	1.00×10^{-5}	0.9	0.05	0.05

Source: DOE, 2002.

Once the frequencies of the accidents are generated, the fractions controlling the amount that is airborne and respirable are required. These fractions are comprised of three additional fractions: the package-release fraction, the fraction of material released that becomes airborne, and the fraction that is airborne which is respirable. These fractions were extracted from DOE Handbook (DOE, 2002). The Type A package fractions are given in Table D-12. These values are conservative because of the lack of data on package failure under severe conditions (DOE, 2002).

Table D-12 Fraction of Package Released, Aerosolized, and Respirable

Accident Severity Category	Release Fraction	Respirable Fraction [a]	Aerosolized Fraction [a]
Truck			
I	0	1	1
II	0.01	1	1
III	0.1	1	1
IV	1	1	1
V	1	1	1
VI	1	1	1
VII	1	1	1
VIII	1	1	1
Rail			
I	0	1	1
II	0.01	1	1
III	0.1	1	1
IV	1	1	1
V	1	1	1
VI	1	1	1
VII	1	1	1
VIII	1	1	1

[a] Assumed very conservative assumption of volatile solid.

Source: DOE, 2002, Tables 6.24 and 6.25.

To evaluate incident-free impacts, other input parameters that affect the exposure duration to the public and crew are required. Table D-13 presents the speed of the vehicle, size of crew, amount of time the package is stopped for driver rest, State inspections, population on adjacent traffic lanes or rail tracks, and other input parameters. The RADTRAN 5 input parameters not described in this appendix were set to the default values in RADTRAN 5.

Table D-13 RADTRAN 5 Input Parameters

Item	Link Type	Truck Transport	Rail Transport
Traffic Volume (vehicle)	Rural	2,400	1
	Suburban	760	1
	Urban	530	1
Vehicle Speed (mph)	Rural	55	40
	Suburban	25	25
	Urban	15	15
Number of People in Adjacent Vehicle		2	4
Size of Crew		2	5
Number People Exposed at Rest Stop		25	N.A.
Exposure Distance at Rest Stop (meters)		20	N.A.
Vehicle Emission Rate (fatalities/km per 1 person/km^2)		8.36×10^{-10}	1.2×10^{-10}
Vehicle Accident		1.42×10^{-8} (fatalities/kilometer)	7.82×10^{-8} (fatalities/ railcar-kilometer)

mph - miles per hour; km - kilometer; km^2 - square kilometer.
To convert from mph to km per hour, multiply by 1.61.
To convert from meters to feet, multiply by 3.28.
To convert from miles to kilometers, multiply by 1.61.
N.A. - not applicable.
Source: DOE, 2002.

D.4.2 RADTRAN 5 Results

This section provides the detailed results of the RADTRAN 5 analyses. Tables D-14 through D-16 present the results by route and type of material being transported for one year by truck. Tables D-17 through D-19 present the results by route and type of material being transported for one year by rail. Tables D-14 and D-17 present the nonradiological impacts from the shipment of radioactive material. They present the estimated potential impact in terms of latent cancer fatalities (LCFs) from the vehicle emissions and fatalities resulting from traffic accidents. Tables D-15 and D-18 present the radiological impacts in terms of LCFs from incident-free transport. Incident-free transport represents the transport of the radioactive shipment without a release from the shipment. Tables D-16 and D-19 present the radiological impacts from accidents during these shipments. Accident results include the impact (risk per year) from various accident scenarios that potentially could occur during the transport of the radioactive material. The results are presented in terms of risk, which means weighting the impact, of the various accident scenarios by the frequency that the accident scenario occurs.

Results are presented in terms of a range of values for each type of shipment. The range represents the impacts from the lowest to highest impact for the various proposed shipping routes. For example, for the feed material, the values represent one year of shipments from both Metropolis, Illinois, and Port Hope,

Ontario, Canada. If some feed materials were provided from Metropolis and the remaining amounts from Port Hope, the impacts would be somewhere between the low and high values (impacts could be evaluated by taking the fraction of material from Metropolis times the impacts from Metropolis plus the fraction of material from Port Hope times the impacts from Port Hope).

To evaluate the impact from transportation of radioactive materials, a scenario first has to be selected. Then the impacts from the various materials and routes should be summed. For example, the proposed NEF would receive feed material from Metropolis, Illinois, in Type 48Y cylinders. The product material would be shipped from the proposed NEF to Wilmington, North Carolina. The solid waste would be shipped from the proposed NEF to Clive, Utah, while the DUF_6 would be shipped to Metropolis, Illinois. The converted U_3O_8 would then be shipped to Clive, Utah, for disposal. The impacts from all these material routes should be summed to determine the impact for this scenario. The results that are labeled as "Total Impacts" contain the results of the impacts summed over each of the four types of material. Therefore, these impacts represent the range from the low to high impacts.

For both truck and rail transport, the nonradiological impacts (fatalities from either traffic and train accidents and LCFs) dominate the impacts for each material-route combination.

Table D-14 Nonradiological Fatalities from Truck Transportation of Radioactive Materials

Material	Route	Occupational		Nonoccupational	
		Normal (LCFs)	Accident (Fatalities)	Normal (LCFs)	Accident (Fatalities)
Feed Material in Type 48X Cylinder	Port Hope, ON	9.7×10^{-3}	6.2×10^{-2}	1.01	2.4×10^{-1}
Feed Material in Type 48Y Cylinder	Port Hope, ON	7.5×10^{-3}	4.8×10^{-2}	7.8×10^{-1}	1.8×10^{-1}
Feed Material in Type 48X Cylinder	Metropolis, IL	5.4×10^{-3}	3.8×10^{-2}	3.7×10^{-1}	1.5×10^{-1}
Feed Material in Type 48Y Cylinder	Metropolis, IL	4.2×10^{-3}	3.0×10^{-2}	2.9×10^{-1}	1.1×10^{-1}
Product in Type 30B Cylinder	Columbia, SC	9.2×10^{-4}	6.1×10^{-3}	7.9×10^{-2}	2.3×10^{-2}
Product in Type 30B Cylinder	Wilmington, NC	1.1×10^{-3}	7.3×10^{-3}	8.4×10^{-2}	2.8×10^{-2}
Product in Type 30B Cylinder	Richland, WA	1.4×10^{-3}	1.1×10^{-2}	7.6×10^{-2}	4.2×10^{-2}
DUF_6 in Type 48Y Cylinder	Paducah, KY	3.9×10^{-3}	2.7×10^{-2}	2.6×10^{-1}	1.1×10^{-1}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	5.1×10^{-3}	3.5×10^{-2}	4.4×10^{-1}	1.3×10^{-1}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	3.8×10^{-3}	2.7×10^{-2}	2.6×10^{-1}	1.0×10^{-1}

Material	Route	Occupational		Nonoccupational	
		Normal (LCFs)	Accident (Fatalities)	Normal (LCFs)	Accident (Fatalities)
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	6.2×10^{-3}	4.7×10^{-2}	5.3×10^{-2}	1.8×10^{-1}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	5.1×10^{-3}	3.9×10^{-2}	3.8×10^{-2}	1.5×10^{-1}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH to NTS	7.2×10^{-3}	5.4×10^{-2}	6.3×10^{-2}	2.1×10^{-1}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	6.0×10^{-3}	4.5×10^{-2}	4.8×10^{-2}	1.8×10^{-1}
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	2.6×10^{-3}	2.0×10^{-2}	1.4×10^{-1}	7.6×10^{-2}
Depleted U_3O_8 in Bulk Bags	Clive, UT	5.1×10^{-3}	3.9×10^{-2}	3.2×10^{-1}	1.5×10^{-1}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	6.6×10^{-3}	5.1×10^{-2}	3.5×10^{-1}	2.0×10^{-1}
CaF_2 in Bulk Bags	Clive, UT	4.3×10^{-3}	3.3×10^{-2}	2.7×10^{-1}	1.3×10^{-1}
CaF_2 in Bulk Bags	Hanford, WA	5.6×10^{-3}	4.3×10^{-2}	2.9×10^{-1}	1.7×10^{-1}
Solid Waste in 55-Gallon Drums	Barnwell, SC	6.2×10^{-5}	4.1×10^{-4}	5.0×10^{-3}	1.6×10^{-3}
Solid Waste in 55-Gallon Drums	Clive, UT	7.4×10^{-5}	5.7×10^{-4}	4.7×10^{-3}	2.2×10^{-3}
Solid Waste in 55-gallon drums	Hanford, WA	9.7×10^{-5}	7.5×10^{-4}	5.1×10^{-3}	2.9×10^{-3}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	5.5×10^{-5}	3.8×10^{-4}	4.7×10^{-3}	1.4×10^{-3}
		Range			
Feed Material	Low	4.2×10^{-3}	3.0×10^{-2}	2.9×10^{-1}	1.1×10^{-1}
	High	9.7×10^{-3}	6.2×10^{-2}	1.01	2.4×10^{-1}
Product	Low	9.2×10^{-4}	6.1×10^{-3}	7.6×10^{-2}	2.3×10^{-2}
	High	1.4×10^{-3}	1.1×10^{-2}	8.4×10^{-2}	4.2×10^{-2}
Disposition of Depleted Uranium	Low	6.4×10^{-3}	4.7×10^{-2}	3.0×10^{-1}	1.8×10^{-1}
	High	1.2×10^{-2}	9.4×10^{-2}	6.4×10^{-1}	3.6×10^{-1}
Waste	Low	5.5×10^{-5}	3.8×10^{-4}	4.7×10^{-3}	1.4×10^{-3}
	High	9.7×10^{-5}	7.5×10^{-4}	5.1×10^{-3}	2.9×10^{-3}
Total Impacts	Low	1.2×10^{-2}	8.3×10^{-2}	6.7×10^{-1}	3.2×10^{-1}
	High	2.4×10^{-2}	1.7×10^{-1}	1.7	6.4×10^{-1}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-15 Radiological LCFs from Incident-Free Truck Transportation of Radioactive Materials

Material	Route	Maximum Individual	Crew	In-Transit			Crew	
				Public Off-Link	Public On-Link	Public Stop	Loading	State Inspection
Feed Material in Type 48X Cylinder	Port Hope, ON	6.7×10^{-9}	1.1×10^{-3}	3.0×10^{-4}	1.5×10^{-3}	1.5×10^{-3}	9.0×10^{-4}	0.0074
Feed Material in Type 48Y Cylinder	Port Hope, ON	5.2×10^{-8}	8.5×10^{-4}	2.3×10^{-4}	1.1×10^{-3}	1.1×10^{-3}	5.4×10^{-4}	4.5×10^{-3}
Feed Material in Type 48X Cylinder	Metropolis, IL	6.7×10^{-9}	5.6×10^{-4}	1.1×10^{-4}	6.2×10^{-4}	6.5×10^{-4}	9.0×10^{-4}	2.0×10^{-3}
Feed Material in Type 48Y Cylinder	Metropolis, IL	5.2×10^{-8}	4.3×10^{-4}	8.9×10^{-5}	4.8×10^{-4}	5.0×10^{-4}	5.4×10^{-4}	1.2×10^{-3}
Product in Type 30B Cylinder	Columbia, SC	3.9×10^{-10}	3.3×10^{-5}	1.1×10^{-5}	5.5×10^{-5}	5.7×10^{-5}	1.6×10^{-4}	6.1×10^{-4}
Product in Type 30B Cylinder	Wilmington, NC	3.9×10^{-10}	3.9×10^{-5}	1.3×10^{-5}	6.4×10^{-5}	6.6×10^{-5}	1.6×10^{-4}	7.3×10^{-4}
Product in Type 30B Cylinder	Richland, WA	3.9×10^{-10}	4.3×10^{-5}	8.7×10^{-6}	5.8×10^{-5}	8.5×10^{-5}	1.6×10^{-4}	8.5×10^{-4}
DUF_6 in Type 48Y Cylinder	Paducah, KY	4.7×10^{-9}	4.0×10^{-4}	8.3×10^{-5}	4.4×10^{-4}	5.7×10^{-4}	6.1×10^{-4}	1.8×10^{-3}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	4.7×10^{-9}	5.5×10^{-4}	1.3×10^{-4}	6.8×10^{-4}	6.9×10^{-4}	6.1×10^{-4}	1.8×10^{-3}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	4.7×10^{-9}	3.9×10^{-4}	8.1×10^{-5}	4.4×10^{-4}	4.6×10^{-4}	6.1×10^{-4}	1.4×10^{-3}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	4.1×10^{-9}	6.0×10^{-4}	9.3×10^{-5}	6.1×10^{-4}	8.0×10^{-4}	1.4×10^{-4}	8.2×10^{-4}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	4.1×10^{-9}	4.8×10^{-4}	7.6×10^{-5}	4.7×10^{-4}	8.0×10^{-4}	1.4×10^{-4}	8.2×10^{-4}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS	4.1×10^{-9}	7.0×10^{-4}	1.1×10^{-4}	7.2×10^{-4}	9.0×10^{-4}	1.4×10^{-4}	1.2×10^{-3}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	4.1×10^{-9}	5.8×10^{-4}	9.6×10^{-5}	5.9×10^{-4}	9.0×10^{-4}	1.4×10^{-4}	1.0×10^{-3}

Material	Route	Maximum Individual	Crew	In-Transit			Crew	
				Public Off-Link	Public On-Link	Public Stop	Loading	State Inspection
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	2.1×10^{-9}	2.5×10^{-4}	3.9×10^{-5}	2.4×10^{-4}	3.1×10^{-4}	7.0×10^{-5}	2.6×10^{-4}
Depleted U_3O_8 in Bulk Bags	Clive, UT	4.1×10^{-9}	4.8×10^{-4}	7.4×10^{-5}	4.9×10^{-4}	6.0×10^{-4}	1.4×10^{-4}	4.1×10^{-4}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	4.1×10^{-9}	6.2×10^{-4}	9.2×10^{-5}	6.1×10^{-4}	9.5×10^{-4}	1.4×10^{-4}	7.2×10^{-4}
CaF_2 in Bulk Bags	Clive, UT	3.5×10^{-9}	4.0×10^{-4}	6.2×10^{-5}	4.1×10^{-4}	5.1×10^{-4}	2.1×10^{-6}	6.3×10^{-6}
CaF_2 in Bulk Bags	Hanford, WA	3.5×10^{-9}	5.3×10^{-4}	7.7×10^{-5}	5.1×10^{-4}	7.6×10^{-4}	2.1×10^{-6}	1.1×10^{-5}
Solid Waste in 55-Gallon Drums	Barnwell, SC	1.1×10^{-12}	2.7×10^{-7}	3.0×10^{-8}	1.5×10^{-7}	1.6×10^{-7}	3.5×10^{-6}	1.3×10^{-4}
Solid Waste in 55-Gallon Drums	Clive, UT	1.1×10^{-12}	2.8×10^{-7}	1.9×10^{-8}	1.3×10^{-7}	1.6×10^{-7}	3.5×10^{-6}	1.0×10^{-5}
Solid Waste in 55-Gallon Drums	Hanford, WA	1.1×10^{-12}	3.7×10^{-7}	2.4×10^{-8}	1.6×10^{-7}	2.4×10^{-7}	3.5×10^{-6}	1.8×10^{-5}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	1.1×10^{-12}	2.3×10^{-7}	2.3×10^{-8}	1.3×10^{-7}	1.6×10^{-7}	3.5×10^{-6}	1.0×10^{-5}
		Range						
Feed	Low	6.7×10^{-9}	4.3×10^{-4}	8.9×10^{-5}	4.8×10^{-4}	5.0×10^{-4}	5.4×10^{-4}	1.2×10^{-3}
	High	6.7×10^{-9}	1.1×10^{-3}	3.0×10^{-4}	1.5×10^{-3}	1.5×10^{-3}	9.0×10^{-4}	7.4×10^{-3}
Product	Low	3.9×10^{-10}	3.3×10^{-5}	8.7×10^{-6}	5.5×10^{-5}	5.7×10^{-5}	1.6×10^{-4}	6.1×10^{-4}
	High	3.9×10^{-10}	4.3×10^{-5}	1.3×10^{-5}	6.4×10^{-5}	8.5×10^{-5}	1.6×10^{-4}	8.5×10^{-4}
Disposition of Depleted Uranium	Low	6.9×10^{-9}	6.4×10^{-4}	1.2×10^{-4}	6.8×10^{-4}	7.7×10^{-4}	1.4×10^{-4}	4.2×10^{-4}
	High	8.9×10^{-9}	1.3×10^{-3}	2.5×10^{-4}	1.4×10^{-3}	1.7×10^{-3}	7.5×10^{-4}	3.0×10^{-3}
Waste	Low	1.1×10^{-12}	2.3×10^{-7}	1.9×10^{-8}	1.3×10^{-7}	1.6×10^{-7}	3.5×10^{-6}	1.0×10^{-5}
	High	1.1×10^{-12}	3.7×10^{-7}	3.0×10^{-8}	1.6×10^{-7}	2.4×10^{-7}	3.5×10^{-6}	1.3×10^{-4}
Total Impacts	Low	1.5×10^{-8}	1.1×10^{-3}	2.2×10^{-3}	1.2×10^{-3}	1.3×10^{-3}	8.4×10^{-4}	2.3×10^{-3}
	High	1.6×10^{-8}	2.4×10^{-3}	5.6×10^{-3}	2.9×10^{-3}	3.3×10^{-3}	1.8×10^{-3}	1.1×10^{-2}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-16 Risk of LCFs from Accidents During Truck Transportation of Radioactive Materials

Material	Route	Ground	Inhaled	Resuspended Soil	Cloud Shine
Feed Material in Type 48X Cylinder	Port Hope, ON	2.4×10^{-7}	1.6×10^{-1}	7.1×10^{-2}	2.2×10^{-11}
Feed Material in Type 48Y Cylinder	Port Hope, ON	2.4×10^{-7}	1.6×10^{-1}	6.8×10^{-2}	2.2×10^{-11}
Feed Material in Type 48X Cylinder	Metropolis, IL	9.0×10^{-8}	5.8×10^{-2}	2.5×10^{-2}	8.1×10^{-12}
Feed Material in Type 48Y Cylinder	Metropolis, IL	8.9×10^{-8}	5.9×10^{-2}	2.4×10^{-2}	8.1×10^{-12}
Product in Type 30B Cylinder	Columbia, SC	8.9×10^{-8}	6.5×10^{-2}	1.3×10^{-2}	3.1×10^{-12}
Product in Type 30B Cylinder	Wilmington, NC	9.6×10^{-8}	7.1×10^{-2}	1.3×10^{-2}	3.3×10^{-12}
Product in Type 30B Cylinder	Richland, WA	8.3×10^{-8}	6.0×10^{-2}	1.4×10^{-2}	2.8×10^{-12}
DUF_6 in Type 48Y Cylinder	Paducah, KY	4.2×10^{-8}	2.6×10^{-2}	1.0×10^{-2}	6.6×10^{-12}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	7.0×10^{-8}	4.3×10^{-2}	1.8×10^{-2}	1.1×10^{-11}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	4.2×10^{-8}	2.5×10^{-2}	1.1×10^{-2}	6.5×10^{-12}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	6.9×10^{-8}	1.2×10^{-4}	8.6×10^{-5}	1.2×10^{-12}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	5.0×10^{-8}	8.6×10^{-5}	5.8×10^{-5}	8.9×10^{-13}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS, NV	8.3×10^{-8}	1.4×10^{-4}	1.0×10^{-4}	1.5×10^{-12}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	6.4×10^{-8}	1.1×10^{-4}	7.4×10^{-5}	1.1×10^{-12}
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	2.6×10^{-8}	4.4×10^{-5}	3.0×10^{-5}	4.6×10^{-12}
Depleted U_3O_8 in Bulk Bags	Clive, UT	5.9×10^{-8}	1.0×10^{-4}	7.7×10^{-5}	1.0×10^{-12}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	6.7×10^{-8}	1.1×10^{-4}	8.3×10^{-5}	1.2×10^{-12}
CaF_2 in Bulk Bags	Clive, UT	4.5×10^{-13}	1.6×10^{-9}	7.3×10^{-9}	1.4×10^{-18}
CaF_2 in Bulk Bags	Hanford, WA	5.1×10^{-13}	1.8×10^{-9}	8.3×10^{-9}	1.6×10^{-18}
Solid Waste in 55-Gallon Drums	Barnwell, SC	2.3×10^{-11}	1.0×10^{-5}	3.5×10^{-5}	1.4×10^{-15}
Solid Waste in 55-Gallon Drums	Clive, UT	1.9×10^{-11}	8.6×10^{-6}	3.0×10^{-5}	1.2×10^{-15}
Solid Waste in 55-Gallon Drums	Hanford, WA	2.2×10^{-11}	9.8×10^{-6}	3.4×10^{-5}	1.4×10^{-15}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	1.9×10^{-11}	8.7×10^{-6}	3.0×10^{-5}	1.2×10^{-15}
	Range				
Feed	Low	8.9×10^{-8}	5.8×10^{-2}	2.4×10^{-2}	8.1×10^{-12}
	High	2.4×10^{-7}	1.6×10^{-1}	7.1×10^{-2}	2.2×10^{-11}

Material	Route	Ground	Inhaled	Resuspended Soil	Cloud Shine
Product	Low	8.3×10^{-8}	6.0×10^{-2}	1.3×10^{-2}	2.8×10^{-12}
	High	9.6×10^{-8}	7.1×10^{-2}	1.4×10^{-2}	3.3×10^{-12}
Disposition of Depleted uranium	Low	5.9×10^{-8}	1.0×10^{-4}	7.7×10^{-5}	1.0×10^{-12}
	High	1.5×10^{-7}	4.3×10^{-2}	1.8×10^{-2}	1.2×10^{-11}
Waste	Low	1.9×10^{-11}	8.6×10^{-6}	3.0×10^{-5}	1.2×10^{-15}
	High	2.3×10^{-11}	1.0×10^{-5}	3.5×10^{-5}	1.4×10^{-15}
Total Impact	Low	2.3×10^{-7}	1.2×10^{-1}	3.7×10^{-2}	1.2×10^{-11}
	High	4.9×10^{-7}	2.7×10^{-1}	1.0×10^{-1}	3.8×10^{-1}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-17 Nonradiological Fatalities from Rail Transportation of Radioactive Materials

Material	Route	Occupational		Nonoccupational	
		Normal (LCFs)	Accident (Fatalities)	Normal (LCFs)	Accident (Fatalities)
Feed Material in Type 48X Cylinder	Port Hope, ON	7.1×10^{-4}	1.2×10^{-1}	4.0×10^{-2}	1.2×10^{-1}
Feed Material in Type 48Y Cylinder	Port Hope, ON	5.5×10^{-4}	8.9×10^{-2}	3.1×10^{-2}	8.9×10^{-2}
Feed Material in Type 48X Cylinder	Metropolis, IL	4.5×10^{-4}	7.3×10^{-2}	1.6×10^{-2}	7.3×10^{-2}
Feed Material in Type 48Y Cylinder	Metropolis, IL	3.5×10^{-4}	5.7×10^{-2}	1.3×10^{-2}	5.7×10^{-2}
Product in Type 30B Cylinder	Columbia, SC	8.2×10^{-5}	1.3×10^{-2}	4.5×10^{-3}	1.3×10^{-2}
Product in Type 30B Cylinder	Wilmington, NC	9.1×10^{-5}	1.5×10^{-2}	4.8×10^{-3}	1.5×10^{-2}
Product in Type 30B Cylinder	Richland, WA	1.1×10^{-4}	1.8×10^{-2}	4.8×10^{-3}	1.8×10^{-2}
DUF_6 in Type 48Y Cylinder	Paducah, KY	2.9×10^{-4}	4.7×10^{-2}	1.3×10^{-2}	4.7×10^{-2}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	4.1×10^{-4}	6.6×10^{-2}	2.1×10^{-2}	6.6×10^{-2}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	3.2×10^{-4}	5.2×10^{-2}	1.2×10^{-2}	5.2×10^{-2}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	2.3×10^{-4}	3.7×10^{-2}	5.7×10^{-3}	3.7×10^{-2}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	2.0×10^{-4}	3.2×10^{-2}	4.7×10^{-3}	3.2×10^{-2}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS	2.6×10^{-4}	4.2×10^{-2}	9.6×10^{-3}	4.2×10^{-2}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	2.2×10^{-4}	3.6×10^{-2}	8.8×10^{-3}	3.6×10^{-2}
Depleted U_3O_8 in bulk bags	Metropolis, IL, to Clive, UT	1.9×10^{-4}	3.2×10^{-2}	4.5×10^{-3}	3.2×10^{-2}
Depleted U_3O_8 in Bulk Bags	Clive, UT	2.0×10^{-4}	3.3×10^{-2}	6.1×10^{-3}	3.3×10^{-2}

Material	Route	Occupational		Nonoccupational	
		Normal (LCFs)	Accident (Fatalities)	Normal (LCFs)	Accident (Fatalities)
Depleted U_3O_8 in Bulk Bags	Hanford, WA	2.5×10^{-4}	4.1×10^{-2}	1.1×10^{-2}	4.1×10^{-2}
CaF_2 in Bulk Bags	Clive, UT	3.8×10^{-4}	6.2×10^{-2}	1.1×10^{-2}	6.2×10^{-2}
CaF_2 in Bulk Bags	Hanford, WA	4.7×10^{-4}	7.7×10^{-2}	2.1×10^{-2}	7.7×10^{-2}
Solid Waste in 55-Gallon Drums	Barnwell, SC	5.4×10^{-6}	8.7×10^{-4}	3.0×10^{-4}	8.7×10^{-4}
Solid Waste in 55-Gallon Drums	Clive, UT	5.8×10^{-6}	9.4×10^{-4}	1.7×10^{-4}	9.4×10^{-4}
Solid Waste in 55-Gallon Drums	Hanford, WA	7.2×10^{-6}	1.2×10^{-3}	3.2×10^{-4}	1.2×10^{-3}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	4.7×10^{-6}	7.7×10^{-4}	2.4×10^{-4}	7.7×10^{-4}
	Range				
Feed	Low	3.5×10^{-4}	5.7×10^{-2}	1.3×10^{-2}	5.7×10^{-2}
	High	7.1×10^{-4}	1.2×10^{-1}	4.0×10^{-2}	1.2×10^{-1}
Product	Low	8.2×10^{-5}	1.3×10^{-2}	4.5×10^{-3}	1.3×10^{-2}
	High	1.1×10^{-4}	1.8×10^{-2}	4.8×10^{-3}	1.8×10^{-2}
Disposition of Depleted Uranium	Low	4.9×10^{-4}	8.0×10^{-2}	1.6×10^{-2}	8.0×10^{-2}
	High	7.3×10^{-4}	1.2×10^{-1}	3.3×10^{-2}	1.2×10^{-1}
Waste	Low	4.7×10^{-6}	7.7×10^{-4}	1.7×10^{-4}	7.7×10^{-4}
	High	7.2×10^{-6}	1.2×10^{-3}	3.2×10^{-4}	1.2×10^{-3}
Total Impact	Low	9.2×10^{-4}	1.5×10^{-1}	3.4×10^{-2}	1.5×10^{-1}
	High	1.5×10^{-3}	2.5×10^{-1}	7.7×10^{-2}	2.5×10^{-1}

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WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-18 Radiological LCFs from Incident-Free Rail Transportation of Radioactive Materials

Material	Route	In-Transit					Crew
		Maximum Individual	Crew	Public Off-Link	Public On-Link	Public Stop	Loading
Feed Material in Type 48X Cylinder	Port Hope, ON	6.8×10^{-9}	3.5×10^{-4}	3.0×10^{-4}	2.4×10^{-5}	7.9×10^{-2}	9.0×10^{-4}
Feed Material in Type 48Y Cylinder	Port Hope, ON	5.3×10^{-9}	6.9×10^{-5}	2.3×10^{-4}	1.9×10^{-5}	6.1×10^{-2}	5.4×10^{-4}
Feed Material in Type 48X Cylinder	Metropolis, IL	6.8×10^{-9}	4.5×10^{-6}	3.4×10^{-6}	2.7×10^{-6}	7.9×10^{-2}	9.0×10^{-4}
Feed Material in Type 48Y Cylinder	Metropolis, IL	5.3×10^{-9}	2.0×10^{-4}	1.2×10^{-4}	9.4×10^{-6}	6.1×10^{-2}	5.4×10^{-4}
Product in Type 30B Cylinder	Columbia, SC	9.1×10^{-10}	4.3×10^{-5}	4.0×10^{-5}	3.0×10^{-6}	1.1×10^{-2}	1.7×10^{-4}
Product in Type 30B Cylinder	Wilmington, NC	9.1×10^{-10}	4.6×10^{-5}	4.3×10^{-5}	3.3×10^{-6}	1.1×10^{-2}	1.7×10^{-4}
Product in Type 30B Cylinder	Richland, WA	9.1×10^{-10}	5.2×10^{-5}	2.6×10^{-5}	2.9×10^{-6}	1.1×10^{-2}	1.7×10^{-4}
DUF_6 in Type 48Y Cylinder	Paducah, KY	1.2×10^{-9}	4.3×10^{-5}	2.8×10^{-5}	2.2×10^{-6}	1.4×10^{-2}	3.1×10^{-3}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	1.2×10^{-9}	5.4×10^{-5}	4.2×10^{-5}	3.4×10^{-6}	1.4×10^{-2}	3.1×10^{-3}
DUF_6 in Type 48Y Cylinder	Metropolis, IL	1.2×10^{-9}	4.5×10^{-5}	2.7×10^{-5}	2.1×10^{-6}	1.4×10^{-2}	3.1×10^{-3}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	5.3×10^{-10}	2.8×10^{-5}	1.1×10^{-5}	1.1×10^{-6}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	5.3×10^{-10}	2.5×10^{-5}	9.5×10^{-6}	9.7×10^{-7}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS, NV	5.3×10^{-10}	3.1×10^{-5}	1.3×10^{-5}	1.5×10^{-6}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	5.3×10^{-10}	2.8×10^{-5}	1.4×10^{-5}	1.4×10^{-6}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	5.3×10^{-10}	2.5×10^{-5}	8.9×10^{-6}	9.3×10^{-7}	6.1×10^{-3}	7.0×10^{-5}
Depleted U_3O_8 in Bulk Bags	Clive, UT	5.3×10^{-10}	2.6×10^{-5}	9.9×10^{-6}	1.1×10^{-6}	6.1×10^{-3}	1.8×10^{-8}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	5.3×10^{-10}	3.1×10^{-5}	1.5×10^{-5}	1.7×10^{-6}	6.1×10^{-3}	7.0×10^{-5}
CaF_2 in Bulk Bags	Clive, UT	9.9×10^{-10}	4.8×10^{-5}	1.8×10^{-5}	2.0×10^{-6}	1.1×10^{-2}	2.4×10^{-6}
CaF_2 in Bulk Bags	Hanford, WA	9.9×10^{-10}	5.7×10^{-5}	2.8×10^{-5}	3.2×10^{-6}	1.1×10^{-2}	2.4×10^{-6}

Material	Route	Maximum Individual	Crew	In-Transit Public Off-Link	In-Transit Public On-Link	In-Transit Public Stop	Crew Loading
Solid Waste in 55-Gallon Drums	Barnwell, SC	1.5×10^{-11}	7.0×10^{-7}	6.2×10^{-7}	4.8×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
Solid Waste in 55-Gallon Drums	Clive, UT	1.5×10^{-11}	7.4×10^{-7}	2.8×10^{-7}	3.1×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
Solid Waste in 55-Gallon Drums	Hanford, WA	1.5×10^{-11}	8.7×10^{-7}	4.3×10^{-7}	4.9×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	1.5×10^{-11}	6.4×10^{-7}	6.0×10^{-7}	4.0×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
		Range					
Feed	Low	5.3×10^{-9}	4.5×10^{-6}	3.4×10^{-6}	2.7×10^{-6}	6.1×10^{-2}	5.4×10^{-4}
	High	6.8×10^{-9}	3.5×10^{-4}	3.0×10^{-4}	2.4×10^{-5}	7.9×10^{-2}	9.0×10^{-4}
Product	Low	2.7×10^{-10}	1.3×10^{-5}	7.7×10^{-6}	8.8×10^{-7}	3.2×10^{-3}	8.3×10^{-5}
	High	2.7×10^{-10}	1.6×10^{-5}	1.3×10^{-5}	9.8×10^{-7}	3.2×10^{-3}	8.3×10^{-5}
Disposition of Depleted Uranium	Low	1.5×10^{-9}	6.8×10^{-5}	2.8×10^{-5}	3.0×10^{-6}	1.8×10^{-2}	2.4×10^{-6}
	High	1.7×10^{-9}	8.8×10^{-5}	5.6×10^{-5}	4.9×10^{-6}	2.0×10^{-2}	3.1×10^{-3}
Waste	Low	1.5×10^{-11}	6.4×10^{-7}	2.8×10^{-7}	3.1×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
	High	1.5×10^{-11}	8.7×10^{-7}	6.2×10^{-7}	4.9×10^{-8}	1.8×10^{-4}	3.5×10^{-6}
Total Impact	Low	7.7×10^{-9}	1.2×10^{-4}	5.8×10^{-5}	8.7×10^{-6}	8.9×10^{-2}	7.1×10^{-4}
	High	9.4×10^{-9}	5.0×10^{-4}	3.9×10^{-4}	3.3×10^{-5}	1.1×10^{-1}	4.2×10^{-3}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

Table D-19 Radiological LCFs from Accidents During Rail Transportation of Radioactive Materials

Material	Route	Ground	Inhaled	Resuspended Soil	Cloud Shine
Feed Material in Type 48X Cylinder	Port Hope, ON	3.2×10^{-7}	2.3×10^{-1}	3.4×10^{-2}	3.2×10^{-11}
Feed Material in Type 48Y Cylinder	Port Hope, ON	3.1×10^{-7}	2.3×10^{-1}	3.3×10^{-2}	3.2×10^{-11}
Feed Material in Type 48X Cylinder	Metropolis, IL	1.4×10^{-7}	1.0×10^{-1}	1.3×10^{-2}	1.4×10^{-11}
Feed Material in Type 48Y Cylinder	Metropolis, IL	1.4×10^{-7}	1.0×10^{-1}	1.3×10^{-2}	1.4×10^{-11}
Product in Type 30B Cylinder	Columbia, SC	1.7×10^{-7}	1.4×10^{-1}	8.1×10^{-3}	6.7×10^{-12}
Product in Type 30B Cylinder	Wilmington, NC	1.8×10^{-7}	1.5×10^{-1}	8.5×10^{-3}	7.2×10^{-12}
Product in Type 30B Cylinder	Richland, WA	1.6×10^{-7}	1.3×10^{-1}	9.2×10^{-3}	6.2×10^{-12}
DUF_6 in Type 48Y Cylinder	Paducah, KY	2.8×10^{-7}	2.4×10^{-1}	5.9×10^{-3}	6.2×10^{-11}
DUF_6 in Type 48Y Cylinder	Portsmouth, OH	4.5×10^{-7}	3.9×10^{-1}	9.9×10^{-3}	9.9×10^{-11}

Material	Route	Ground	Inhaled	Resuspended Soil	Cloud Shine
DUF_6 in Type 48Y Cylinder	Metropolis, IL	2.6×10^{-7}	2.2×10^{-1}	5.3×10^{-3}	5.7×10^{-11}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to NTS, NV	3.7×10^{-8}	7.1×10^{-5}	1.4×10^{-5}	7.3×10^{-13}
Depleted U_3O_8 in Bulk Bags	Paducah, KY, to Clive, UT	3.1×10^{-8}	5.9×10^{-5}	1.1×10^{-5}	6.1×10^{-13}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to NTS, NV	5.7×10^{-5}	1.1×10^{-4}	2.4×10^{-5}	1.1×10^{-12}
Depleted U_3O_8 in Bulk Bags	Portsmouth, OH, to Clive, UT	5.4×10^{-8}	1.0×10^{-4}	2.2×10^{-5}	1.1×10^{-12}
Depleted U_3O_8 in Bulk Bags	Metropolis, IL, to Clive, UT	7.9×10^{-8}	3.0×10^{-4}	1.7×10^{-5}	1.8×10^{-13}
Depleted U_3O_8 in Bulk Bags	Clive, UT	3.7×10^{-8}	7.1×10^{-5}	1.5×10^{-5}	7.3×10^{-13}
Depleted U_3O_8 in Bulk Bags	Hanford, WA	6.7×10^{-8}	1.3×10^{-4}	2.9×10^{-5}	1.3×10^{-12}
CaF_2 in Bulk Bags	Clive, UT	7.0×10^{-13}	2.5×10^{-9}	1.1×10^{-8}	2.1×10^{-18}
CaF_2 in Bulk Bags	Hanford, WA	1.2×10^{-12}	4.5×10^{-9}	2.1×10^{-8}	3.9×10^{-18}
Solid Waste in 55-Gallon Drums	Barnwell, SC	4.5×10^{-11}	2.2×10^{-5}	5.4×10^{-5}	3.1×10^{-15}
Solid Waste in 55-Gallon Drums	Clive, UT	2.4×10^{-11}	1.2×10^{-5}	2.9×10^{-5}	1.6×10^{-15}
Solid Waste in 55-Gallon Drums	Hanford, WA	4.3×10^{-11}	2.1×10^{-5}	5.4×10^{-5}	2.9×10^{-15}
Solid Waste in 55-Gallon Drums	Oak Ridge, TN	4.0×10^{-11}	2.0×10^{-5}	4.8×10^{-5}	2.8×10^{-15}
		Range			
Feed	Low	1.4×10^{-7}	1.0×10^{-1}	1.3×10^{-2}	1.4×10^{-11}
	High	3.2×10^{-7}	2.3×10^{-1}	3.4×10^{-2}	3.2×10^{-11}
Product	Low	1.6×10^{-7}	1.3×10^{-1}	8.1×10^{-3}	6.2×10^{-12}
	High	1.8×10^{-7}	1.5×10^{-1}	9.2×10^{-3}	7.2×10^{-12}
Disposition of Depleted Uranium	Low	3.7×10^{-8}	7.1×10^{-5}	1.5×10^{-5}	7.3×10^{-13}
	High	5.8×10^{-5}	3.9×10^{-1}	1.0×10^{-2}	1.0×10^{-10}
Waste	Low	2.4×10^{-11}	1.2×10^{-5}	2.9×10^{-5}	1.6×10^{-15}
	High	4.5×10^{-11}	2.2×10^{-5}	5.4×10^{-5}	3.1×10^{-15}
Total Impact	Low	3.3×10^{-7}	2.3×10^{-1}	2.1×10^{-2}	2.1×10^{-11}
	High	5.8×10^{-5}	7.7×10^{-1}	5.3×10^{-2}	1.4×10^{-10}

ON - Ontario, Canada. IL - Illinois. SC - South Carolina. NC - North Carolina.
WA - Washington. KY - Kentucky. OH - Ohio. UT - Utah.
TN - Tennessee. NV - Nevada. NTS - Nevada Test Site.

D.5 Chemical Impact Analysis Resulting from Accidents with UF_6 Cylinders

If UF_6 is released to the atmosphere, it reacts with water vapor in the air to form hydrofluoric acid and uranyl fluoride (UO_2F_2) and is independent of the enrichment of the UF_6 (i.e., natural, enriched, or depleted). The products are chemically toxic to humans. Hydrofluoric acid is extremely corrosive and can damage the lungs and cause death if inhaled at high enough concentrations. In addition, uranium is a heavy metal that, in addition to being radioactive, can have toxic chemical effects (primarily on the kidneys) if it enters by way of ingestion and/or inhalation (DOE, 2004a).

DOE analyzed the chemical impacts from the transportation of DUF_6 from the East Tennessee Technology Park to the Portsmouth and Paducah Gaseous Diffusion Plants (DOE, 2004a; DOE, 2004b). These results were used to estimate the chemical impacts associated with the proposed NEF. Their results are applicable because the chemical impacts would not vary with: (1) the shipping route, (2) the amount of enrichment, and (3) similar shipping containers. Since DOE postulated a hypothetical accident that could occur at any location, the results are not route dependent. DOE evaluated chemical impacts to rural (6 persons per square kilometer [15 persons per square mile]), suburban (719 persons per square kilometer [1,798 persons per square mile]), and urban (1,600 persons per square kilometer [4,000 persons per square mile]) areas. In addition, the proposed NEF would use the same containers (Type 48Y cylinders) that DOE evaluated. Chemical impacts are not dependent on enrichment of the uranium only on the amount if uranium in the container.

The toxic effects, or chemical impacts, can be categorized as adverse health effects or irreversible adverse health effects. An adverse health effect includes respiratory irritation or skin rash associated with lower chemical concentrations. An irreversible adverse health effect generally occur at higher chemical concentrations and are permanent in nature. Irreversible adverse health effects include death, impaired organ function (such as central nervous system or lung damage), and other effects that may impair daily functions. Of those individuals receiving an irreversible adverse health effect, approximately 1 percent or less would die from it (LES, 2004a).

Acute effects evaluated were assumed to exhibit a threshold nonlinear relationship with exposures; that is, some low level of exposure can be tolerated without inducing a health effect. Chemical-specific threshold concentrations were developed for potential adverse effects and potential irreversible adverse effects. To address maximally exposed individuals, the locations of maximum chemical concentration were identified for shipments with the largest potential releases. Estimates of exposure duration at those locations were obtained from modeling output and were used to assess whether maximally exposed individual exposure to uranium and hydrofluoric acid would exceed the criteria for potential irreversible adverse effects. The primary exposure pathway would be inhalation as it results in the highest exposure for the chemicals. Acute effects from ingestion and absorption through the skin would be less than for inhalation (DOE 2004a; DOE 2004b).

DOE used the FIREPLUME model to simulate the dispersion of toxic gases and particulates from transportation accidents involving UF_6 fires. The model can simulate three phases that UF_6 fires may undergo. These include (1) the instantaneous puff that is released in a hydraulic rupture, (2) the emissions from the continuous fire that occurs afterwards, and (3) the emissions from the cool-down phase in which releases decline to zero as the temperature of the fire declines. The location of the maximally exposed individual is assumed to be 30 meters (100 feet) or farther from the release point (DOE, 2004a, DOE 2004b).

DOE evaluated chemical impacts for both neutral and stable meteorological conditions. Neutral meteorological conditions are defined as Pasquill stability class D conditions (wind speed of 4 meters per second [9 miles per hour]) while stable meteorological conditions are defined as Pasquill stability class F (wind speed of 1 meter per second [2 miles per hour]) (DOE 2004a, DOE 2004b). Results for stable meteorological conditions are presented in this appendix because the impacts are greater than for neutral conditions and are therefore bounding.

The potential transportation chemical consequences of an accident involving UF_6 are shown in Table D-20 for both truck and rail. This table also shows the potential chemical consequences of a severe transportation accident assumed to have occurred involving the transportation of depleted U_3O_8 from a DUF_6 conversion facility to a disposal facility. The probability that this accident could occur is very remote. The results show that while adverse chemical impacts would be high, few individuals would experience irreversible adverse health effects and less than one death would be expected.

Table D-20 Potential Chemical Consequences to the Population from Severe Transportation Accidents

Source	Mode	Rural	Suburban	Urban
Number of Persons with the Potential for Adverse Health Effects				
DUF_6	Truck	6	760	1,700
	Rail	110	13,000	28,000
Depleted U_3O_8 (in bulk bags)	Truck	0	12	28
	Rail	0	47	103
Number of Persons with the Potential for Irreversible Adverse Health Effects[a]				
DUF_6	Truck	0	1	3
	Rail	0	2	4
Depleted U_3O_8 (in bulk bags)	Truck	0	5	10
	Rail	0	17	38

[a] Exposure to hydrofluoric acid or uranium compounds is estimated to result in fatality to approximately 1 percent or less of those persons experiencing irreversible adverse effects.
Source: DOE, 2004a; DOE, 2004 b.

D.6 Uncertainty in Transportation Risk Assessment

There are many sources of uncertainty in assessing the risks of transporting radioactive materials to and from the proposed NEF. Several factors that can be quantified are: routing of the material, the shipping container characteristics, mode of transport, and source or destination of the material. Each of these sources of uncertainty are discussed below.

D.6.1 Routing of Radioactive Material

There are many varying routes for the shipments of the radioactive materials to and from the proposed NEF. The WebTragis computer code simplifies the routing choices by allowing the analyst to select various routing restrictions. These can range from no restrictions to Highway Route Controlled Quantity restrictions. Choices can be made between shortest route, fastest route, block various routes, etc. For this Draft EIS, the NRC staff examined two different types of routing: the shortest with commercial, hazardous, and radioactive restrictions and Highway Route Controlled Quantity restrictions one of the most restrictive route specifications. For shipments in the eastern part of the US, the two different routes did not vary to any significant amount. For shipments to Clive, Utah; Richland and Hanford, Washington; and the Nevada Test Site, Nevada, the two different routes could vary significantly.

A comparison of the RADTRAN 5 results for comparable shipments indicated that for all but one route, Highway Route Controlled Quantity routing yields the greater impacts. For this one route, the variation impacts were less than 1 percent. Therefore, the NRC staff used the Highway Route Controlled Quantity routing.

D.6.2 Shipping Container Characteristics

The characteristics of the shipping container are important in the assessment of both the incident-free and the accident impacts. The incident-free impact is determined by the direct radiation along the side of the shipping container and the length of the container. The accident impacts are determined by the release fraction for each accident severity class. Historically, NUREG-0170 (NRC, 1977) was developed to provide background material for a review by the NRC of regulations dealing with the transportation of radioactive materials. In 2002, DOE prepared a resource handbook for transportation risk assessment (DOE, 2002). That document presented a review of the historical assessments, transportation models, and a compilation of supporting data parameters and generally accepted assumptions. DOE/EA-1290 also evaluated the shipments of DUF_6 in Type 48Y containers; however, the release fractions were about one quarter of the DOE handbook values (DOE, 1999).

The NRC staff chose to use the release fractions from the DOE handbook for Type A containers as being more conservative than those presented in DOE/EA-1290.

D.6.3 Mode of Transport

The use of truck or rail can affect the impact analysis in several different ways. First the number of trips can be reduced greatly by the use of railroads rather than trucks. Therefore, the impact from vehicle emissions and accidents involving trains is reduced with the use of railroads. However, since a railcar can transport more material, the impacts from the release of radioactive material during an accident would be greater. The capacity of trucks can also affect the impact analysis. In a similar way, the larger the truck, the more material can be transported, resulting in fewer trips but higher impacts from the release of radioactive material during an accident.

The NRC staff evaluated the transportation impacts from the use of both trucks and rail.

D.6.4 Source or Destination of Radioactive Material

The source or destination of the radioactive material can also affect the transportation impact analysis. For example, as discussed in Section D.4.2, it is not expected that all of the feed material would come

exclusively from Port Hope, Ontario, Canada, or from Metropolis, Illinois. It is a reasonable assumption that some feed would come from Port Hope and some would come from Metropolis. Therefore, the impact from the transportation of feed material would be somewhere between the impacts evaluated for Port Hope and Metropolis.

D.7 References

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(DOE, 2002) U.S. Department of Energy. "A Resource Handbook on DOE Transportation Risk Assessment." DOE/EM/NTP/HB-01. National Transportation Program. July 2002.

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(DOE, 2004b) U.S. Department of Energy. "Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site." DOE/EIS-0360. Office of Environmental Management. June 2004.

(LES, 2004a) Louisiana Energy Services. "National Enrichment Facility Environment Report." Revision 2. NRC Docket No. 70-3103. July 2004.

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APPENDIX E - AIR-QUALITY ANALYSIS

This appendix presents the analysis for determining the visibility impacts from operation of the Louisiana Energy Services (LES) proposed National Enrichment Facility (NEF) site and an assessment of the potential impacts due to high wind speed conditions.

E.1 Analysis for the Potential for Fog from the Proposed NEF

There is the potential for visual impacts in the local area from fog that could be generated by the cooling towers during operation under the proper weather conditions. Conditions are considered to be favorable for fog formation when humidity is high, wind speed is low, and atmosphere is stable. One concern is that under low wind speed conditions (less than 3 meters per second [9.8 feet per second]) and high relative humidity (greater than 95 percent), the cooling towers might significantly reduce visibility due to the generation of fog. To investigate potential visual impact from the cooling towers, meteorological data were analyzed for these conditions. Hourly surface observations at Midland-Odessa, Texas, for the five most recent years of data were used in this analysis as recommended by the U.S. Environmental Protection Agency (EPA) (NCDC, 1998). These meteorological data were used as input in the air-quality modeling.

Hourly observations of wind speed and relative humidity for Midland-Odessa, Texas, from the International Surface Weather Observations database for the five-year period from 1987 through 1991 were examined. From all observations within that period, relative humidity was higher than 95 percent in 527 cases (or 1.2 percent per year). Figure E-1 shows the wind speed for such conditions. From 527 observations when relative humidity was higher than 95 percent, only 193 cases were observed when wind speed was below 3 meters per second (9.8 feet per second) and stability was neutral (D), stable (E), or very stable (F). This corresponds to less than 0.5 percent of total number of hours per year.

To determine time of day and seasonality for atmospheric conditions favorable for fog formation, frequency distributions were generated for all observations when relative humidity is greater than 95 percent, wind speed is less than 3 meters per second (9.8 feet per second), and stability is D, E, or F. Figure E-2 shows a histogram of hour of day and Figure E-3 shows a histogram of month of year for such conditions for all hours in the years 1987 through 1991. The figures show that such atmospheric conditions occur mostly early in the morning or late in the evening.

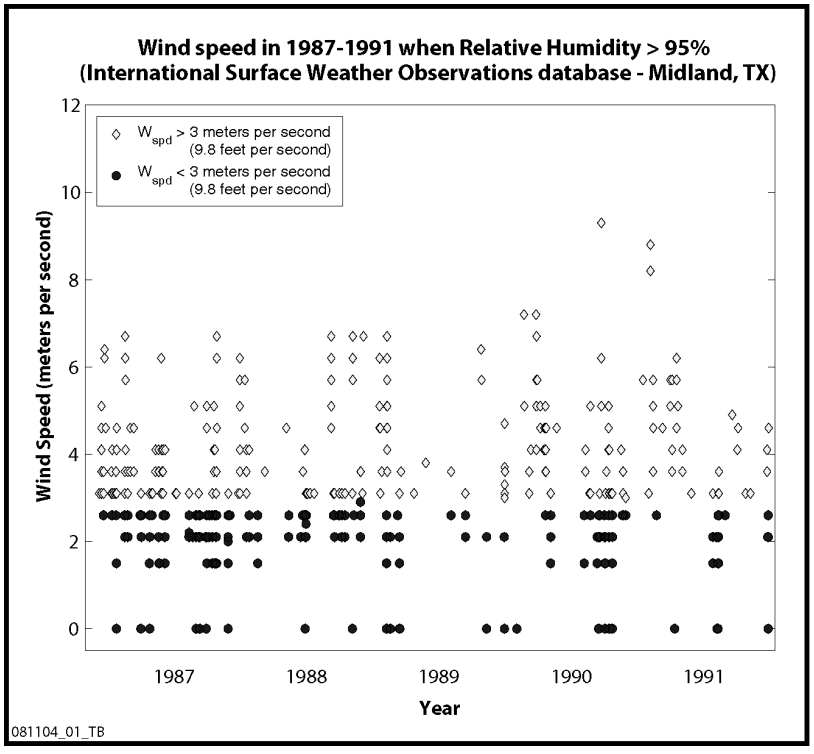

Figure E-1 Wind Speed in High Relative Humidity Conditions for Midland-Odessa, Texas (NCDC, 1998)

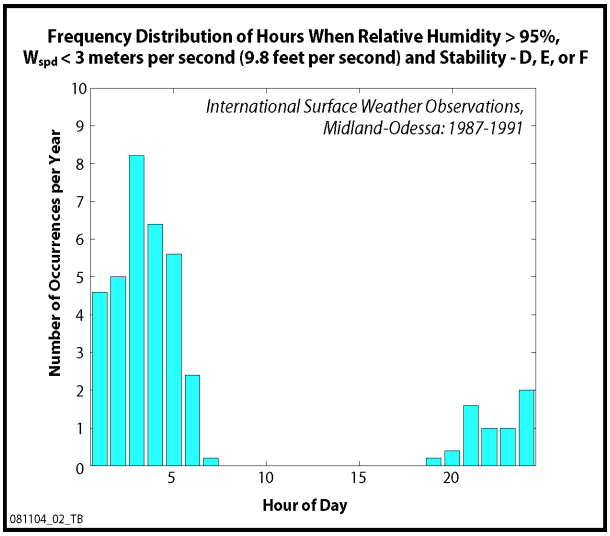

Figure E-2 Histogram of Hour of Day (1987-1991) for Favorable Conditions for Fog (NCDC, 1998)

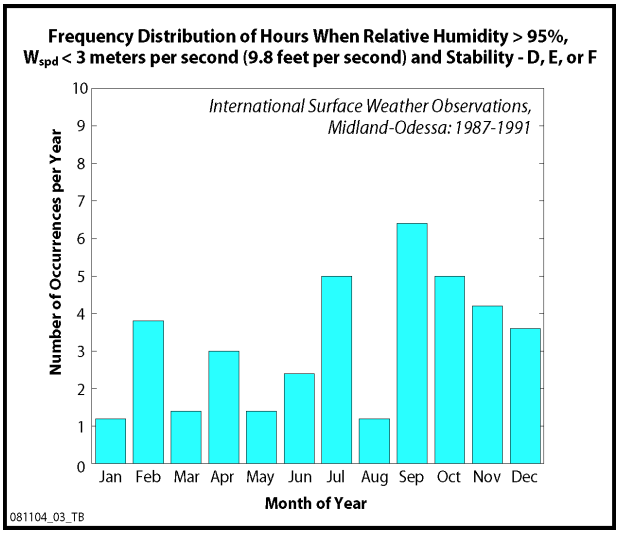

Figure E-3 Histogram of Month of Year (1987-1991) for Favorable Conditions for Fog (NCDC, 1998)

Another concern is that the cooling towers may increase the probability of freezing and icing on the ground. To determine time of day and seasonality for atmospheric conditions favorable to such conditions, frequency distributions were generated for all observations when relative humidity was greater than 95 percent, wind speed was less than 3 meters per second (9.8 feet per second); stability was D, E, or F; and temperature was below 0ºC (32ºF). Figure E-4 shows a histogram of hour of day and Figure E-5 shows a histogram of month of year for such conditions for all hours in the years 1987 through 1991. The figures show that such atmospheric conditions occur mostly early in the morning or late in the evening in late fall and winter (November through February).

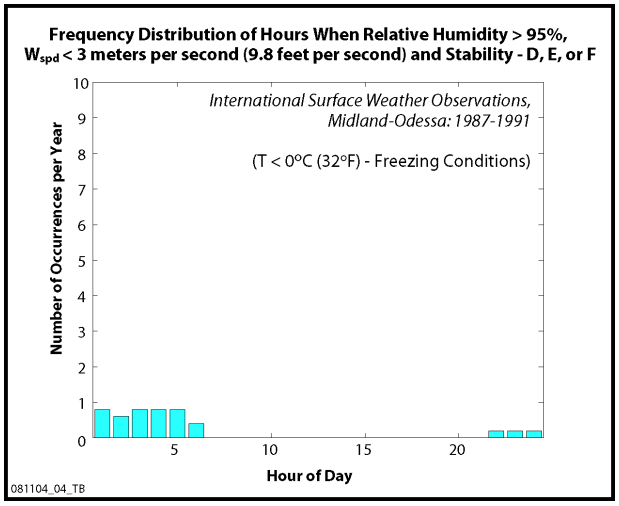

Figure E-4 Histogram of Hour of Day for Favorable Conditions for Icing on the Ground (NCDC, 1998)

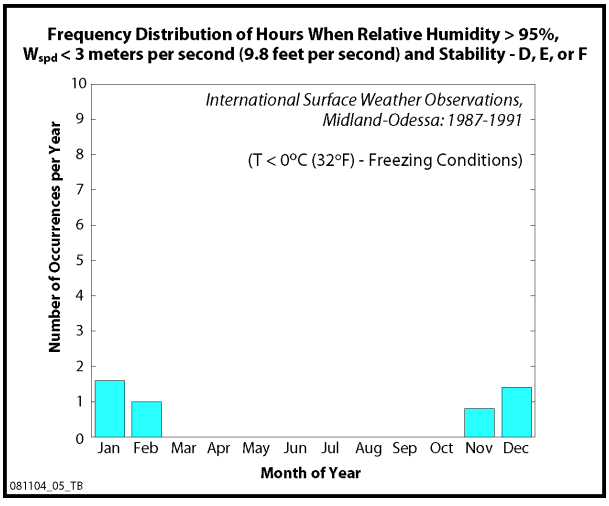

Figure E-5 Histogram of Month of Year for Favorable Conditions for Icing on the Ground (NCDC, 1998)

E.2 Analysis of the Potential Effects of High Winds

The analysis of meteorological observations indicates the presence of high prevailing southerly winds in this area. There is a concern that emissions from the proposed NEF plant could be carried by these strong southerly winds over Hobbs, New Mexico, in less than 1 hour. Five years of hourly meteorological observations at the Midland-Odessa National Weather Station were analyzed to determine frequency of occurrence of strong southerly winds. Figure E-6 shows frequency distribution of wind direction for all hours in 1987-1991 (upper panel), winds greater than 8 meters per second (26.2 feet per second) but less than 14 meters per second (45.9 feet per second) (middle panel), and only for those hours when wind speed exceeds 14 meters per second (45.9 feet per second) (lower panel). These strong winds fall into a category "gale" (greater than 15 meters per second [49.2 feet per second]) or "storm" (greater than 25 meters per second [82.0 feet per second]) type of winds. Wind speed of 14 meters per second (45.9 feet per second) corresponds to 1 hour of travel time, so the trajectory can reach a 50-kilometer (31.1-mile) distance.

When wind speed is less than 14 meters per second (45.9 feet per second) but greater than 8 meters per second (26.2 feet per second), the trajectory can reach a 25-kilometer (15.5-mile) distance or more (and possibly reach Hobbs in 1 hour). As shown in Figure E-6, the histogram of wind direction for all hours (all wind speeds) has a maximum at 180 degrees (southerly winds), whereas the histogram of wind direction for hours when wind speeds exceed 14 meters per second (45.9 feet per second) has a maximum at 270 degrees (westerly winds). This indicates that strong winds (category "gale" or "storm") in the study area are predominately from the west.

However, these are relatively rare events—statistical analysis shows that only for 1 percent of the time in a 5-year period (102 hours total) are winds greater than 14 meters per second (45.9 feet per second) (i.e., category "gale" or "storm"). To determine atmospheric conditions associated with these strong westerly winds in the area, histograms of other related parameters were created. Figures E-7a and E-7b show histograms of hour, day, month of year, and stability class for all hours in 1987-1991 when (a) winds are greater than 8 meters per second (26.2 feet per second) but less than 14

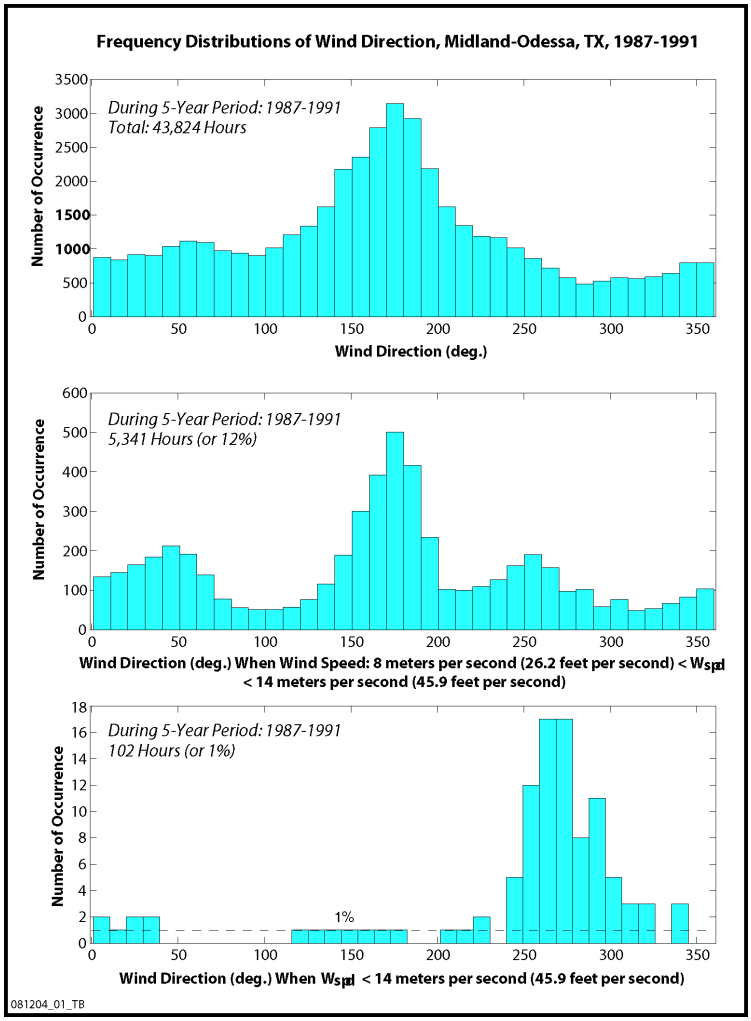

Figure E-6 Frequency Distribution of Wind Direction for All Hours (1987-1991)

meters per second, and (b) winds are stronger than 14 meters per second (45.9 feet per second). As can be seen from these figures, the very strong westerly winds occur mostly in the afternoon in spring under neutral stability conditions. Strong, but not extreme wind speeds between 8 meters per second (26.2 feet per second) and 14 meters per second (45.9 feet per second) (i.e., below category "gale") are mostly from the south. Total number of hours when winds are strong, but still below the "gale" category, is approximately 12 percent of all hours in 1987-1991.

To estimate spatial gradient in potential pollutant concentration from the proposed NEF, a sensitivity test was conducted. This sensitivity test helps to visualize possible transport of material from the proposed NEF during the strong wind episodes. A surface release was simulated using the Industrial Source Complex Short-Term (ISCST3) dispersion model (EPA, 1995) using data from March 1, 1991. This was a typical "high wind case", when winds were above 14 meters per second (45.9 feet per second) from 11 a.m. until 6 p.m., mostly from the west-southwest, and stability was neutral. The results from this simulation are shown in Figure E-8. Average 24-hour concentrations are shown as a shaded image overlaid on a schematic map of the study area. This figure shows that a narrow plume would extend to the west from the proposed NEF source.

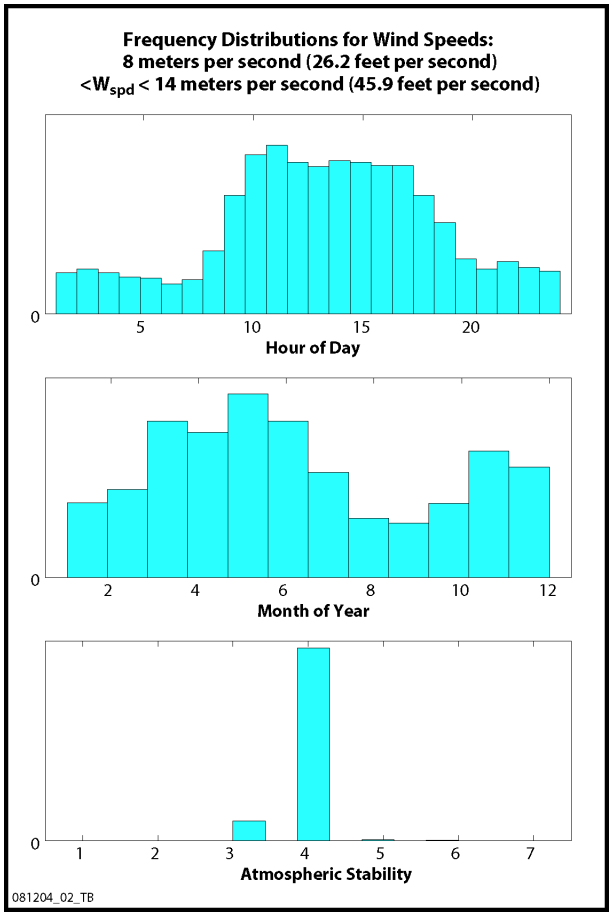

Figure E-7a Histogram of Occurrences of Strong Winds

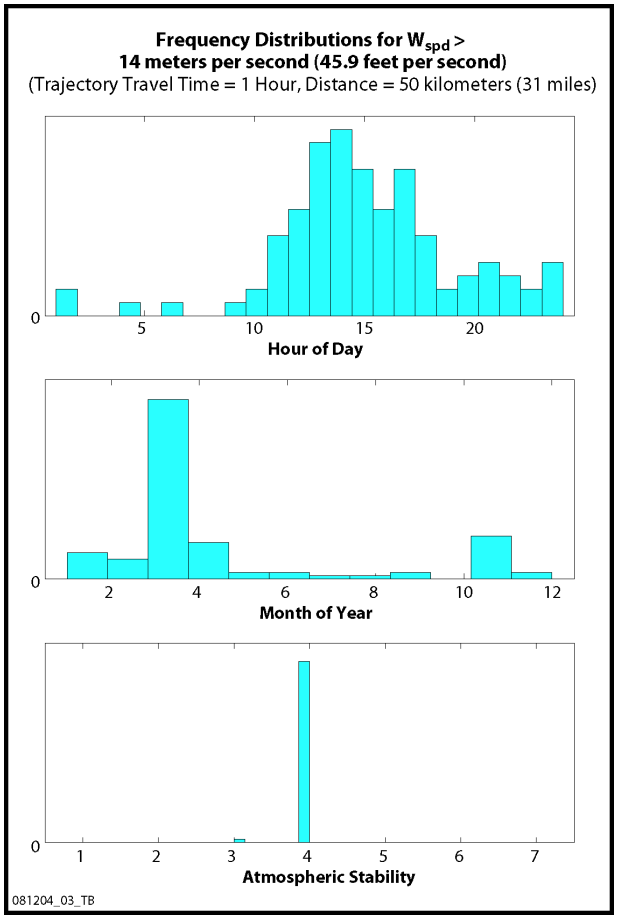

Figure E-7b Histogram of Occurrences of Extreme Winds

Another sensitivity test was conducted to investigate possible effects of strong southerly but not extreme winds (again between 8 meters per second [26.2 feet per second] and 14 meters per second [45.9 feet per second]) on pollutant concentrations, when pollutants may possibly reach Hobbs. March 10, 1991, was selected for this simulation and 24-hour average concentrations were estimated. The wind speed was approximately 10 meters per second (32.8 feet per second) from 9 a.m. until 10 p.m., mostly from the south, and stability was neutral. Figure E-9 shows the results from this simulation. Average 24-hour concentrations are shown as a shaded image overlaid on a schematic map of the study area. The figure shows a narrow plume extending to the north from the source.

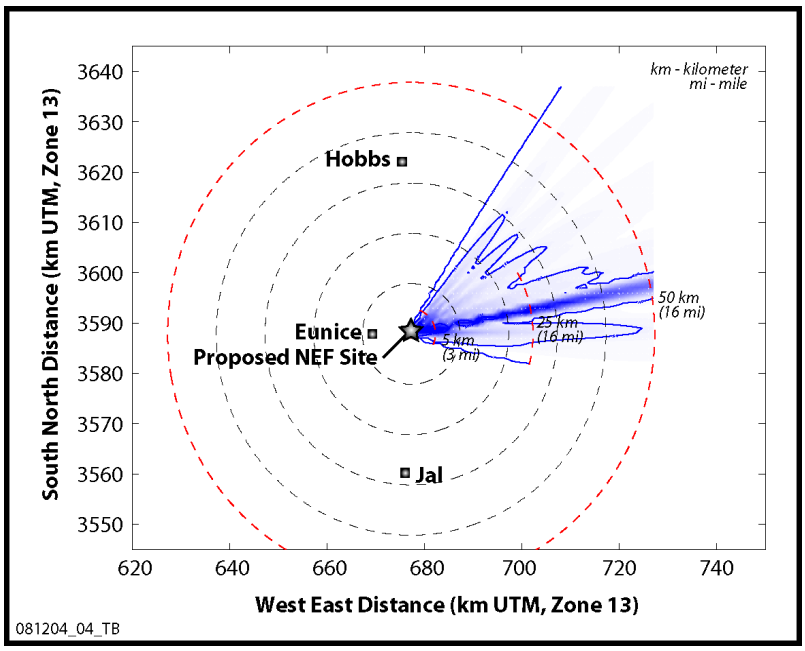

Figure E-8 Average 24-Hour Concentrations of Pollutants in Extreme Winds from the West-Southwest

These sensitivity tests indicate that pollutants may possibly reach Hobbs during strong wind episodes. However, atmospheric conditions when winds can be characterized as "gale" or "storm" are rare, and levels of concentrations are expected to be significantly lower at distances greater than 25 kilometers (15.5 miles). Spatial gradients in modeled pollutant concentrations were also estimated. A sensitivity test was conducted for the same day (March 10, 1991), with winds from the south, so the plume extends to the north from the proposed NEF source. The results from this simulation are shown in Figure E-10. The figure shows the decrease in concentrations at the plume centerline due to dispersion processes as a function of distance from the source. As can be seen from the figure, the concentration decreases by a factor of 1,000 when the possible plume from the proposed NEF reaches Hobbs.

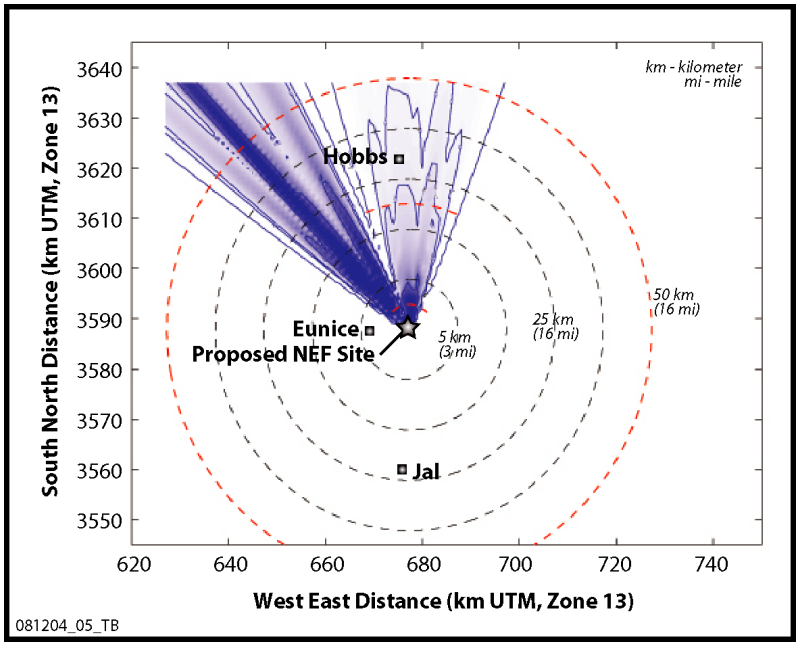

Figure E-9 Average 24-Hour Concentrations of Pollutants in Strong Southerly Winds

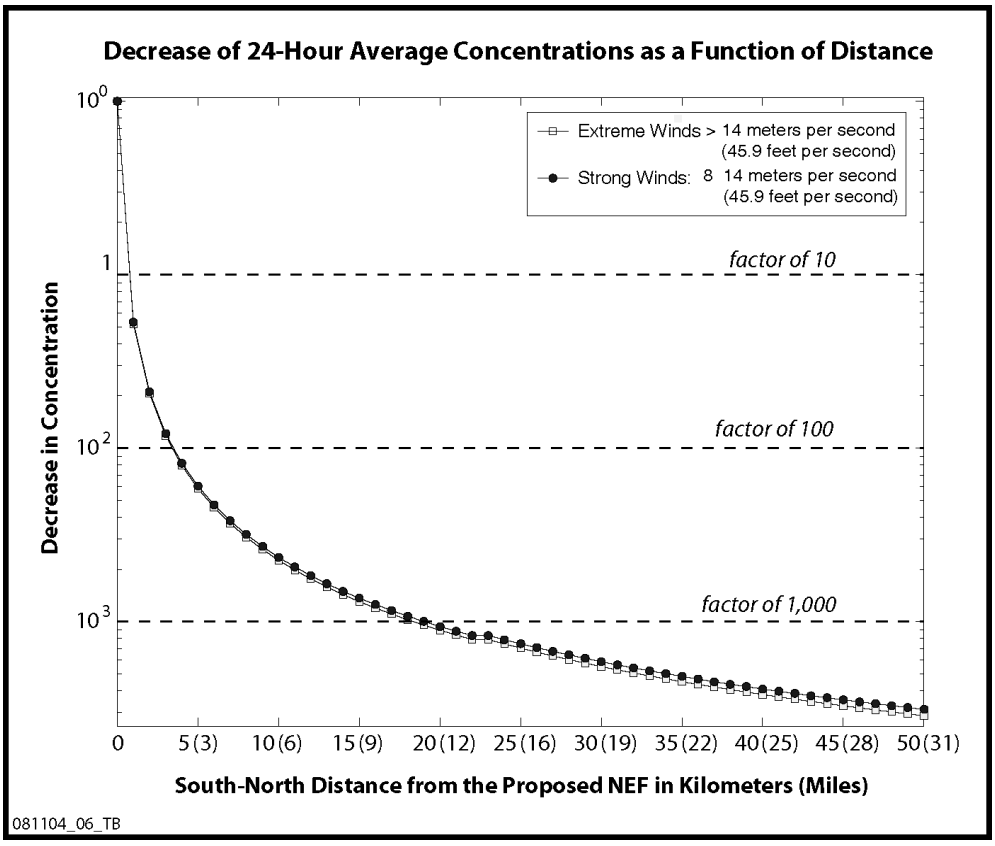

Figure E-10 Pollutant Concentrations at the Plume Centerline as a Function of Distance from the Proposed NEF

E.3 References

(EPA, 1995) U.S. Environmental Protection Agency. *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models.* Volume I. EPA-454/B-95-003a. Research Triangle Park, North Carolina. September 1995.

(NCDC, 1998) National Climate Data Center. "International Surface Weather Observations 1982-1997." CDROM. September 1998. <http://nndc.noaa.gov/?http://ols.nndc.noaa.gov/plolstore/plsql/olstore.prodspecif?prodnum=C0042-CDR-A0001> (Accessed 6/02/04).

APPENDIX F - SOCIOECONOMICS

F.1 Impacts

This appendix presents the potential socioeconomic impacts of the Louisiana Energy Services (LES) proposed National Enrichment Facility (NEF) using cost data for local construction and operations (LES, 2004). These data and Regional Input-Output Modeling System (RIMS II) final demand multipliers, specifically developed for the 120-kilometer (75-mile) region of influence, were used to estimate impacts on output, earnings, and jobs (BEA, 1997). These final demand multipliers and results are shown in Table F-1 for construction and Table F-2 for operations. For the output and earnings multipliers, each multiplier indicates the change in output or earnings for each $1 change in final demand. The jobs multiplier indicates the additional jobs created for each $1 million dollars in local spending.

Table F-1 Total Estimated Average Annual Impact of the Proposed NEF Construction

Good/Service	Local Purchases	Final Demand Multipliers			Total Impact		
		Output ($000)	Earnings	Jobs	Output ($000)	Earnings ($000)	Jobs
Concrete	$625	1.7112	0.5087	16.4	$1,070	$318	10
Reinforcing Steel	$63	1	0	0	$63	$0	0
Structural Steel	$250	1	0	0	$250	$0	0
Lumber	$31	1	0	0	$31	$0	0
Site Preparation	$2,500	1.6002	0.4459	13.7	$4,001	$1,115	34
Transportation	$250	1.7782	0.5066	17.7	$445	$127	4
Subcontracts							
Precast Concrete	$2,500	1.6002	0.4459	13.7	$4,001	$1,115	34
Architectural - Building	$5,000	1.6002	0.4459	13.7	$8,001	$2,230	69
Equipment	$3,125	1.6002	0.4459	13.7	$5,001	$1,393	43
Mechanical/Piping/ Heating Ventilation and Air Conditioning	$9,375	1.6002	0.4459	13.7	$15,002	$4,180	129
Electrical Controls	$9,375	1.6002	0.4459	13.7	$15,002	$4,180	129
Payroll	$15,521	0.8182	0.2216	8.4	$12,699	$3,440	130
Total	**$48,615**				**$65,564**	**$18,097**	**582**

Source: LES, 2004; BEA, 2004.

Table F-2 Total Estimated Average Annual Impact of the Proposed NEF Operations

Good/Service	Local Purchases ($000)	Final Demand Multipliers			Total Impact		
		Output	Earnings	Jobs	Output ($000)	Earnings ($000)	Jobs
Landscaping	$75	1.6154	0.7509	38.2	$121	$56	3
Protective Clothing	$30	1.4698	0.3211	13.4	$44	$10	0
Lab Chemicals	$50	1.7137	0.3411	6.5	$86	$17	0
Plant Spare Equipment	$170	1.4774	0.3783	10.7	$251	$64	2
Office Equipment	$160	1	0	0	$160	$0	0
Engineered Parts	$150	1.6005	0.5761	16.6	$240	$86	2
Electrical Parts	$220	1.5052	0.4576	14.9	$331	$101	3
Natural Gas	$56	2.8977	0.3734	7.3	$162	$21	0
Waste Water	$93	1.7537	0.4507	12.0	$163	$42	1
Solid Waste Disposal	$3	1.7537	0.4507	12.0	$5	$1	0
Insurance	$0	1.5546	0.5486	17.7	$0	$0	0
Catering	$50	1.5453	0.4801	30.2	$77	$24	2
Building Maintenance	$370	1.5772	0.4727	14.8	$584	$175	5
Custodial Services	$250	1.7909	0.7261	41.7	$448	$182	10
Professional Services	$180	1.6377	0.6922	18.8	$295	$125	3
Security Services	$500	1.4976	0.6315	28.9	$749	$316	14
Mail & Document Services	$100	1.6370	0.7074	19.5	$164	$71	2
Office Supplies	$140	1	0	0	$140	$0	0
Electric Services	$7,000	1.5129	0.2892	5.5	$10,590	$2,024	38
Payroll	$10,520	0.8182	0.2216	8.4	$8,608	$2,331	88
Total	**$20,117**				**$23,218**	**$5,646**	**173**

Source: LES, 2004; BEA, 2004.

F.2 References

(BEA, 1997) Bureau of Economic Analysis. *Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II).* U.S. Department of Commerce. Washington, D.C. March 1997.

(BEA, 2004) Bureau of Economic Analysis. *RIMS II Multipliers for the Hobbs, New Mexico, and Odessa-Midland, Texas, Region.* U.S. Department of Commerce. Washington, D.C. March 2004.

(LES, 2004) Louisiana Energy Services. "National Enrichment Facility Environmental Report." Revision 2. NRC Docket No. 70-3103. July 2004.

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APPENDIX G - ENVIRONMENTAL JUSTICE

G.1 Introduction

This appendix provides additional material for the assessment of the potential for disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from the proposed construction, operation, and decommissioning of the Louisiana Energy Services (LES) proposed National Enrichment Facility (NEF).

Table G-1 presents the detailed census data for the environmental justice review and provides the minority and low-income population data for each census block group within 80 kilometers (50 miles) of the proposed NEF site (USCB, 2002a; USCB, 2002b). Minority and low-income block groups that are shown in bold meet the U.S. Nuclear Regulatory Commission criteria in NUREG-1748 (NRC, 2003); therefore, environmental justice should be considered in greater detail. These criteria are defined as (1) the minority and/or low-income populations exceed 50 percent in a block group or (2) the minority and/or low-income population in the block group is significantly greater than the State or relevant county percentage. This information was used in the environmental justice analysis described in Chapter 3 of this Draft Environmental Impact Statement (Draft EIS).

Table G-1 Census Block Groups Within 80 Kilometers (50 Miles) of the Proposed NEF Site[a]

County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
State of New Mexico		1,819,046	18.4	66.8	2.1	10.2	1.4	19.0	0.6	42.1	55.3
Threshold for Environmental Justice Concerns			38.4	—	22.1	30.2	21.4	39.0	20.6	50.0/42.1	50.0
Eddy County											
000700	1	759	15.1	75.8	0.8	1.3	0.1	21.5	0.5	39.3	41.7
000800	1	654	20.5	65.2	0.3	1.8	0.2	32.3	0.2	**66.8**	**68.6**
000900	1	136	13.9	77.4	0.8	2.7	0.1	18.5	0.6	34.1	37.0
Lea County											
000100	1	935	21.9	52.5	5.2	1.4	1.2	**39.5**	0.2	**65.0**	**72.6**
000100	2	829	28.1	57.2	5.3	2.4	0.5	34.0	0.6	**52.4**	**60.9**
000100	3	682	**54.8**	42.1	3.1	1.0	0.2	**53.1**	0.6	**73.9**	**77.4**
000200	1	677	30.7	64.0	0.7	2.1	0.2	32.3	0.7	**58.5**	**60.7**
000200	2	592	32.9	47.8	6.4	1.9	0.0	**43.1**	0.8	**62.8**	**69.6**
000200	3	585	24.9	67.4	0.5	1.2	0.7	30.3	0.0	*47.7*	**50.4**
000200	4	563	32.9	61.6	2.5	2.0	0.7	32.5	0.7	**55.2**	**59.7**
000200	5	565	**52.1**	42.7	4.3	1.6	0.0	**51.3**	0.2	**71.2**	**75.9**
000300	1	686	30.3	24.8	**39.8**	1.9	0.0	32.8	0.7	**52.9**	**92.3**
000300	2	810	**46.7**	42.2	7.8	2.1	0.0	**47.0**	0.9	**69.0**	**78.8**
000300	3	820	**41.6**	43.7	11.0	1.2	0.4	**43.3**	0.5	**70.1**	**81.8**
000300	4	985	**56.9**	52.8	4.9	0.2	0.4	**41.4**	0.3	**63.4**	**68.9**
000400	1	775	**57.0**	27.5	21.3	1.3	0.3	**48.6**	1.0	**68.0**	**91.0**

County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
000400	2	1,053	25.9	56.1	10.0	1.8	0.8	30.7	0.7	**50.5**	**62.9**
000400	3	661	**42.8**	31.0	21.0	1.1	0.8	**44.8**	1.4	**68.8**	**90.8**
000501	1	781	2.9	**86.6**	2.1	0.5	1.3	9.1	0.5	12.7	16.9
000501	2	848	7.2	**84.3**	1.7	3.1	0.1	10.7	0.1	22.8	27.5
000501	3	533	**39.6**	75.1	5.6	2.6	0.8	15.8	0.2	26.1	34.0
000501	4	1,063	16.7	**80.1**	3.5	1.8	0.9	13.0	0.9	20.9	26.6
000501	5	775	9.8	**89.9**	1.6	0.9	0.9	6.6	0.1	9.7	13.8
000501	6	718	7.2	**83.6**	3.5	1.5	0.1	11.0	0.3	18.2	24.0
000501	7	1,381	5.2	**87.8**	2.6	0.8	1.1	7.2	0.4	12.2	16.6
000502	1	920	25.4	**69.0**	4.6	1.2	0.0	24.6	0.7	35.9	42.4
000502	2	968	28.2	65.4	4.8	0.8	0.7	28.0	0.3	41.4	47.1
000502	3	1,002	16.9	71.6	6.4	1.4	0.0	20.4	0.3	31.1	38.5
000502	4	810	3.7	**86.2**	2.6	1.7	2.4	6.4	0.7	11.4	17.9
000502	5	1,052	15.3	77.3	2.5	1.1	0.9	18.1	0.3	25.2	29.6
000502	6	786	31.4	59.3	14.6	0.8	0.1	24.0	1.2	34.5	**50.5**
000600	1	805	4.8	**89.7**	2.4	1.2	1.4	5.3	0.0	10.8	15.9
000600	2	734	4.3	**90.7**	1.1	0.8	0.4	6.7	0.3	10.6	12.9
000600	3	901	4.7	76.1	2.1	1.6	0.0	20.0	0.2	30.7	34.2
000600	4	756	22.2	74.2	3.0	0.8	0.7	21.2	0.1	31.0	35.7
000600	5	811	23.0	38.7	14.2	1.0	0.0	**45.4**	0.7	**66.1**	**81.3**
000600	6	957	17.5	48.5	13.4	2.1	0.1	35.3	0.6	**63.3**	**76.9**
000600	7	906	11.4	59.3	7.5	2.8	1.4	28.5	0.6	41.8	**52.8**
000700	1	1,052	7.7	**83.2**	0.8	1.1	0.7	14.2	0.1	21.5	24.1

County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
000700	2	1,899	1.7	68.6	9.1	3.7	0.7	17.8	0.1	40.7	**54.2**
000700	3	882	13.2	83.8	0.6	1.1	0.6	13.8	0.1	22.3	24.5
000700	4	812	13.8	83.1	0.9	1.6	0.1	14.2	0.1	18.2	20.7
000700	5	1,331	19.0	84.8	1.0	2.0	0.3	11.9	0.0	23.4	26.7
000700	6	1,930	13.7	85.6	1.0	1.3	1.2	10.5	0.4	16.4	19.9
000800	1	850	10.2	75.7	0.5	0.7	0.0	23.2	0.0	32.1	33.6
000800	2	618	3.6	82.0	0.5	1.5	0.2	15.5	0.3	24.8	26.9
000800	3	773	24.1	67.9	2.6	1.7	0.5	27.2	0.1	*48.6*	**52.8**
000800	4	655	25.6	66.3	0.9	0.8	0.5	31.6	0.0	41.2	44.3
000900	1	562	17.8	79.5	0.2	1.1	0.2	18.9	0.2	28.6	30.1
000900	2	726	24.1	57.3	1.4	2.6	0.0	38.3	0.4	**51.1**	**53.9**
000900	3	830	12.5	68.0	0.1	2.3	0.0	28.9	0.7	39.2	41.2
001002	1	819	24.4	53.7	2.0	2.0	0.5	**41.8**	0.1	**55.3**	**58.6**
001002	2	1,357	19.3	64.2	2.5	1.4	0.2	31.6	0.2	*45.8*	49.8
001002	3	975	22.6	60.3	2.1	0.8	1.4	35.4	0.0	**51.7**	**54.6**
001002	4	713	25.3	51.5	3.1	1.7	0.3	**43.3**	0.1	**65.1**	**69.0**
001002	5	945	28.4	53.3	10.5	1.3	0.1	34.8	0.0	**56.9**	**68.9**
001002	6	592	20.2	51.9	3.2	0.5	0.2	**43.9**	0.3	**62.0**	**66.6**
001002	7	853	31.3	68.8	0.1	2.0	0.6	28.3	0.2	*47.4*	49.4
001003	1	870	25.7	53.2	4.3	0.2	1.3	**41.0**	0.0	**59.0**	**64.0**
001003	2	1,080	20.4	53.2	1.9	1.4	0.1	**42.9**	0.6	**64.5**	**67.8**
001003	3	873	17.7	79.0	0.0	1.0	0.7	19.1	0.1	29.2	30.2
001003	4	813	8.4	77.5	3.9	1.1	0.4	16.6	0.5	27.1	32.7

County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
001100	1	6	26.8	71.1	0.3	1.4	0.2	27.1	0.0	30.6	32.3
001100	3	980	21.6	71.4	1.1	0.2	1.1	26.1	0.0	35.0	37.2
001100	4	822	14.1	75.5	1.1	1.8	0.1	20.7	0.8	30.9	32.7
001100	5	612	11.3	82.0	1.4	2.0	0.3	14.0	0.5	21.9	25.0
Total N. Mexico Block Groups			66								
State of Texas		20,851,820	15.4	71.0	11.7	0.9	3.0	13.0	0.4	32.0	47.6
Threshold for Environmental Justice Concerns			35.4	—	31.7	20.9	23.0	33.0	20.4	50.0/32.0	50.0
Andrews County											
950100	3	896	9.6	85.4	1.1	1.3	1.3	10.9	0.0	24.7	28.2
950100	4	591	9.9	84.3	0.5	1.9	2.9	10.5	0.0	19.8	25.9
950200	1	1,289	17.2	73.9	6.0	1.9	0.3	17.6	0.3	*37.5*	46.2
950200	2	923	19.8	68.8	2.7	0.9	1.1	26.4	0.1	*49.8*	**54.9**
950200	3	1,176	22.7	76.0	2.1	1.3	0.8	19.3	0.5	*37.6*	41.4
950200	6	692	7.2	75.4	2.2	1.0	0.3	21.1	0.0	*41.2*	43.5
950200	7	775	14.7	88.4	1.2	1.0	0.0	8.8	0.7	21.8	23.7
950200	8	752	0.0	94.7	0.4	0.7	2.0	2.1	0.1	5.1	8.8
950300	1	642	19.2	60.1	1.1	0.3	1.4	**37.1**	0.0	**70.6**	**72.7**
950300	2	593	22.4	72.2	3.7	1.0	0.0	22.9	0.2	**55.3**	**59.5**
950300	3	514	27.6	69.8	0.4	3.1	1.2	25.5	0.0	*48.6*	**53.1**
950300	4	914	15.7	69.4	2.0	2.2	0.3	25.7	0.4	**54.2**	**57.3**
950300	5	856	25.7	74.2	0.2	1.2	1.2	23.0	0.2	**61.1**	**63.7**
950400	6	420	9.8	86.9	0.5	0.2	1.7	10.7	0.0	*35.0*	37.9
950400	7	1,523	18.6	78.6	0.5	1.2	0.1	17.1	0.1	*40.4*	41.6

County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
Ector County											
002200	1	622	10.0	82.3	0.2	1.2	0.0	16.1	0.3	*37.8*	39.3
002700	2	0	15.7	76.5	0.8	0.8	0.3	21.5	0.2	*40.1*	41.7
002700	4	690	17.1	64.4	1.8	1.3	0.2	31.7	0.6	**59.1**	**61.9**
003000	1	586	3.8	92.7	0.7	0.9	0.4	5.4	0.0	9.7	11.4
003000	2	38	2.8	88.8	0.3	1.7	0.3	8.9	0.0	14.8	16.7
Gaines County											
950100	1	246	25.2	80.6	0.5	1.4	0.0	16.8	0.7	*35.2*	36.5
950100	2	770	20.1	76.9	1.2	1.8	0.0	20.1	0.0	*42.5*	45.1
950100	3	778	21.3	68.1	7.5	0.1	0.1	23.5	0.6	**56.9**	**65.6**
950100	4	836	33.9	54.8	8.4	2.3	0.0	**34.3**	0.2	**69.6**	**79.4**
950100	5	584	20.6	78.3	2.4	0.0	0.0	18.7	0.7	*37.5*	41.4
950200	1	1,455	20.6	84.7	0.9	1.2	0.3	12.8	0.1	*32.1*	33.9
950200	2	2,470	17.7	83.4	1.2	1.1	0.0	14.0	0.3	23.4	24.9
950200	3	1,759	29.7	90.0	1.6	0.7	0.3	7.4	0.1	14.6	17.2
950300	1	818	24.5	70.8	5.5	1.7	0.7	21.1	0.1	**57.2**	**62.6**
950300	2	797	14.6	77.2	0.8	0.5	0.5	21.1	0.0	*45.7*	47.7
950300	3	1,243	16.2	91.1	1.5	0.5	0.6	6.4	0.1	18.7	21.8
950300	4	921	19.5	81.8	0.9	0.1	0.5	16.5	0.2	*40.8*	42.7
950300	5	1,281	21.1	78.0	3.1	2.7	1.1	15.1	0.0	*49.3*	**53.9**
Loving County											
950100	1	28	0.0	89.6	0.0	0.0	0.0	10.4	0.0	10.4	10.4
Terry County											
950100	3	41	15.8	82.1	0.0	2.2	0.0	15.8	0.0	*36.0*	36.2

County/ Tract	Block Group	Persons	Below Poverty Level (%)	White (%)	African American/ Black (%)	American Indian and Alaskan Native (%)	Asian or Other Pacific Islander (%)	Other Race (%)	Two or More Races (%)	Hispanic or Latino (All Races) (%)	Minorities (Racial Minorities Plus White Hispanics) (%)
Winkler County											
950200	1	720	17.0	80.4	1.3	0.3	0.0	17.2	0.8	*36.5*	38.1
950200	2	644	**37.4**	74.2	0.2	0.8	0.0	24.7	0.2	*41.1*	42.4
950200	3	846	11.8	69.4	5.1	1.1	0.0	24.3	0.1	*45.6*	**51.3**
950300	1	372	31.1	61.6	1.9	0.0	0.0	**34.9**	1.6	**75.8**	**79.0**
950300	2	673	14.0	76.2	2.8	0.5	0.9	19.2	0.5	*44.6*	48.7
950300	3	674	13.5	80.1	1.5	0.3	0.0	26.3	0.2	*41.8*	43.3
950300	4	994	15.5	71.9	3.0	1.3	0.1	23.6	0.0	*44.8*	49.2
950300	5	785	27.7	66.0	0.8	0.6	1.0	31.6	0.0	**62.7**	**64.3**
950400	1	589	9.5	78.5	1.1	0.6	0.0	19.1	0.7	*36.6*	38.0
950400	2	749	16.9	86.1	0.8	0.4	0.0	12.7	0.0	23.9	25.0
Yoakum County											
950100	1	128	14.4	84.2	1.7	0.0	0.0	14.1	0.0	*34.4*	36.1
950200	1	1,019	22.3	69.8	2.9	0.5	0.1	26.3	0.4	*41.7*	44.9
950200	2	1,138	20.6	67.0	1.1	1.3	0.4	30.0	0.2	**52.9**	**55.2**
950200	3	767	22.2	76.3	0.9	0.5	0.0	22.2	0.1	*40.7*	42.2
950200	4	1,220	19.1	59.3	1.1	1.3	0.2	**38.1**	0.1	**54.8**	**56.2**
950200	5	967	16.1	77.4	2.7	1.1	0.0	18.9	0.0	*34.2*	38.1
Total Texas Block Groups			51								
Grand Total			117								

[a] Minority block groups meeting standard Office of Nuclear Material Safety and Safeguards criteria are shown in bold. Additional block groups meeting special Hispanic/Latino criteria are shown in italics. Threshold criteria are shown in the table. Special Hispanic/Latino criteria are 42.1 percent for New Mexico, 32.0 percent for Texas.
Source: USCB, 2002a; USCB, 2002b.

G.2 References

(EPA, 1999) U.S. Environmental Protection Agency. "Consideration of Cumulative Impacts in EPA Review of NEPA Documents." EPA 315-R-99-002. Office of Federal Activities (2252A). May 1999.

(NRC, 2003) U.S. Nuclear Regulatory Commission. "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." NUREG-1748. Office of Nuclear Material Safety and Safeguards. Washington, D.C. August 2003.

(USCB, 2002a) U.S. Census Bureau. "Table DP-1. Profile of General Demographic Characteristics: 2000." May 7, 2002. <http://censtats.census.gov/data/NM/05035025.pdf> (Accessed 2/26/04).

(USCB, 2002b) U.S. Census Bureau. "Table DP-4. Profile of Selected Housing Characteristics: 2000." May 3, 2002. <http://censtats.census.gov/data/TX/05048003.pdf> (Accessed 2/26/04).